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Effects of Balance Training On Falls Efficacy for Older Adults Residing In Assisted- Living Facilities

James Norman Hurtubise

To the Graduate Council:

I am submitting herewith a dissertation written by James Norman Hurtubise entitled "Effects of Balance Training On Falls Efficacy for Older Adults Residing In Assisted- Living Facilities." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Human Ecology.

Diane Klein, Major Professor

We have read this dissertation and recommend its acceptance:

Jim Neutens, June Gorski, John Orme, Buck Jones

Accepted for the Council:
Dixie L. Thompson

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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Dr. June Gorski

Dr. John Orme

Dr. Buck Jones

Accepted for the Council:

Anne Mayhew
Vice Chancellor and
Dean of the Graduate Studies

(Original signatures are on file with official student records.)

EFFECTS OF BALANCE TRAINING ON FALLS EFFICACY FOR OLDER ADULTS RESIDING IN ASSISTED-LIVING FACILITIES

A Dissertation
Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

James Norman Hurtubise
May 2006

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Over the last five years, this journey has been filled with many highs, few lows, and a one-year-and-a-half hiatus. However, the successful completion of this undertaking is one that would not have been possible if it weren't for the unending support of my Mom and Dad, and my wife, Courtney. Their faith enabled me to finish what I thought at times I never would. It is they who reminded me to always "soar like an eagle". I would especially like to thank Dr. Diane Klein for her leadership and guidance. As chairperson of my committee, I will never forget how supportive and encouraging she was with all of my academic and personal decisions. She truly wanted what was best for me all of the time. I would like to thank Dr. John Orme, Dr. Buck Jones, Dr. Jim Neutens, and Dr. June Gorski for their help and support during this endeavor. Pursuing a Ph.D. requires the efforts of an entire team and throughout the five years my committee functioned as a unit with one mission…to stretch, mold, and make me the best doctoral student possible. To teach is to leave a footprint in the lives of people so that they may influence the future. This endeavor was filled with many teachable moments and many great teachers. To all of you, thank you.

ABSTRACT

This study investigated the impact of a four-week foam-support balance training program on falls self-efficacy in assisted-living older adults. A Falls Self-Efficacy Scale (FES) and four balance performance measures (single-leg stand, tandem stand, functional reach, and eight-foot up-and-go) were completed to measure functional status and fear of falling. The sample consisted of fifteen older adults from two separate assisted-living facilities. Participants (N = 8) from one facility served as the control group, while those (N = 7) from the other facility represented the intervention group. There were 6 females and 2 males in the control group ranging in age from 79 to 86 years (M = 83, SD = 3.52). The 3 females and 4 males in the intervention group, ranged in age from 86 to 93 years (M = 89, SD = 2.73). FES scales and balance measures were completed on the same day. The pre-test-adjusted post-test mean for falls efficacy level in the intervention group (M = 13.82) was less than in the control group (M = 16.73). Pre-test-adjusted post-test means for single-leg stand, tandem stand, and functional reach scores for the intervention group were higher than those for the control group, (M = 5.50 vs. M = 3.35; M = 308.55 vs. M = 171.73; M = 11.40 vs. M = 10.34, respectively). For the eight-foot up-and-go test, the pre-test-adjusted post-test mean score for the intervention group (M = 11.81) was lower than for the control group (M = 12.3). Results suggest that the older adults who participated in the four-week balance training program may have reduced their fear of falling and improved their balance; however, there were no statistically significant differences between the groups, except for the single-leg stand.

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1. BACKGROUND

INCIDENCE

Falls are the primary cause of death for those ages 80 and older and the second most common cause of death resulting from unintentional injuries for those aged 55 – 79 years (National Safety Council, 2000). Falls are the most frequently reported adverse incident in long-term care facilities (Gurwitz, Sanchez-Cross, Eckler, & Matulis, 1994). A fall can be defined as any event in which a person inadvertently or intentionally comes to rest on the ground or another low level (Tideiksaar, 1998). In 15-20% of falls, individuals who fall may experience a serious injury, including fracture, soft tissue injury, joint dislocation, and mobility impairment. Approximately 50% of people who fall and break their hips are never functional walkers again (Spirduso, 1995). Women fall more frequently than men, but men have a higher mortality rate (Nickens, 1985) resulting from a fall. At least 40% of older assisted-living residents fall annually, with a mean incidence rate of 1.5 falls per bed per year (Nygaard, 1998).

RISK FACTORS

Risk factors for falling are classified as intrinsic or extrinsic. Intrinsic factors are internal to the individual. Increased age, a history of falls, impaired balance, poor muscle strength, and various age-related physiologic changes and chronic conditions of various body systems, particularly cardiovascular and neurological conditions are examples of intrinsic risk factors (Davis, Ross, Nevitt, & Wasnich, 1999; Mustard & Mayer, 1997; Tinetti & Williams, 1998).

Craik (1989) suggests that the cause of falls can be divided into two categories: (1) the stimulus that results in the loss of balance; and (2) the inability of the older adult to correct for the unexpected loss of balance. Examples of stimuli that can cause falling are dizziness, fainting, the use of medication, or uneven surfaces. The inability to correct for an unexpected loss of stability results from elements of the normal aging process, such as decreased reaction time, diminished central nervous system integration, decreased strength, bone density loss, and loss of joint mobility (Spirduso, 1995). In addition to being a consequence of falling, fear of falling has been identified as an intrinsic risk factor for falling (Baloh, Jacobson, Enrietto, Corona, & Honrubia, 1998). There is evidence that falls efficacy, the confidence that an individual has to do daily activities without falling, is an important factor to consider in fall prevention efforts (Tinetti, Richman, & Powell, 1990).

Extrinsic risk factors for falling are those environmental hazards that increase the chances of falling such as the presence of throw rugs, low lighting, and slippery floors (North American Nursing Diagnosis Association, 2001; Schoenfelder, 2000). The way older persons function in and interact with their environments also affects their safety. One study suggested that those who are distracted by doing a familiar, manual task along with functional maneuvers are more apt to fall (Lundin-Olsson, Nyberg, & Gustafson, 1998).

PHYSICAL FUNCTION

Healthy aging is an individual's ability to maintain three key behaviors: low risk of disease or disease related disability, active engagement in life, and high mental and

physical function (Rowe & Kahn, 1998). Physical function is assessed in terms of activities of daily living (ADLs) and instrumental activities of daily living (IADLs) (AoA, 2004). Activities of daily living are activities that represent one's ability to manage bodily care, and include eating, dressing, bathing, toileting, transferring (from standing to a bed or a chair, etc.), grooming, and bladder and bowel control. Instrumental activities of daily living reflect one's ability to maintain a safe and clean household including meal preparation, shopping, taking medications, managing money, telephoning, heavy chores, light housework, transportation, and laundry (AoA, 2004).

Loss of balance increases the risk of falls, affecting the ability of older adults to perform activities of daily living and instrumental activities of daily living, limiting an independent quality of life. Additionally, fall-related injuries and their consequences are associated with declining function in ADLs (Tinetti, Speechley, & Ginter, 1988) and are the leading cause of death from injuries for these individuals (Sattin, 1992).

SELF-EFFICACY

As individuals age, the resulting deterioration in function and the restriction in performance of ADLs and IADLs serve to reduce older adults' sense of control (Mazzeo, Cavanagh, Evans, Fiatarone, Hagberg, & McAuley, 1999). In the physical activity and aging literature, this sense of control is viewed as self-efficacy beliefs. Self-efficacy refers to an individual's perception of capabilities within a particular domain of activities (Bandura, 1982). As defined by Bandura (1982), individuals are not merely confident or not, but rather have a degree of efficacy or confidence within a specific activity.

Self-confidence is strongly linked to functional decline since persons with low perceived efficacy or confidence in performing certain activities tend to avoid them (Bandura, 1982). One study found that efficacy has been consistently identified as a determinant of fall reduction and functional decline in older adults (Mazzeo et al, 1999). Researchers also reported that higher self-efficacy beliefs are related to higher self-reported levels of physical functioning (Mendes de Leon, Seeman, Baker, Richardson, & Tinetti, 1996). Self-efficacy is influenced by the presence of relevant skills in the activity area, by past experience, by observing the experience of others, and by social persuasion (Bandura, Adams, & Beyer, 1977; Kazdin, 1979; Strecher, McEnvoy, Vellas, Becker, & Rosenstock, 1986).

FEAR OF FALLING (FOF)

Fear of falling is defined as a lasting concern about falling that leads an individual to avoid activities that he/she remains capable of performing (Tinetti, & Powell, 1993). In effect, fear of falling decreases physical function and social interaction for older adults. Older adults with a low fall-related self-efficacy experience a decline in unassisted activities of daily living, have a deteriorating perception of the quality of their life, and are at an increased risk of future falls (Cumming, Salkeld, Thomas, & Szonyi, 2000; Tinetti, Mendes de Leon, Doucette, & Baker, 1994). Further, people who are afraid of falling tend to have a history of falling, do poorly on tests of gait and balance, have poor vision, need assistance with ADLs and rate their health as poor (Arfken, Lach, Birge, & Miller, 1994; Howland, Peterson, Levin, Fried, Pordon, & Bak, 1998).

Individuals often avoid walking, thereby weakening their muscles and minimizing the use of physiological balance systems because of their fear of falling. Impaired mobility provokes a fear of falling, which may lead to older adults losing their confidence in ambulation, refusing to walk, and consequently, becoming more immobile (Spirduso, 1995). Reduced physical activity by older adults can lead to a declining cycle of physical and mental health eventually resulting in a more dependent lifestyle.

Fear of falling has been evaluated by the question "Are you afraid of falling?" and more recently by the "Falls Efficacy Scale" (FES) (Baloh, Spain, & Socotch, 1995; Lawrence, Tennstedt, & Kasten, 1998; Maki, 1991; Vellas, Wayne, Romero, Baumgartner, & Garry, 1997). The FES is based on the operational definition of fear as a low perceived self-confidence at avoiding falls during essential, relatively non-hazardous activities (Tinetti et al., 1994). Low scores on a Falls Efficacy Scale (FES) are associated with poor physical and social function, as well as, decline in performing ADLs without assistance, deteriorating quality of life, and increased risk of future falls (Cumming et al., 2000; Tinetti et al., 1994). In pilot studies of the FES, researchers were able to determine that risk factors for low efficacy are also risk factors for falls (Tinetti, et al., 1990).

BALANCE TRAINING PROGRAMS

Prior research supports the use of structured exercise programs to improve balance and mobility function, thus reducing the risk for falls or the frequency of falls (Lord, Ward, & Williams, 1995; Province, Hadley, & Hornbrook, 1995; Wolf, Barnhart, & Kutner, 1996). Researchers found that a multidimensional exercise program can

improve balance and mobility, decrease fall risk in older adults, and enhance functional ability (Shumway-Cook, Gruber, Baldwin, & Liao, 1997).

Balance control can be taught to the elderly and results in improved functioning. Roberts (1989) reported changes in balance among older adults following a six-week program of aerobic walking. He attributed these balance changes to improvements in strength, coordination, and flexibility. A nine-week program of physical exercise performed twice weekly resulted in improved performance on balance assessments in 70 to 75 year old participants in a Swedish community (Ledin, Kronhed, Moller, Moller, Odvist, & Olsson, 1991).

Participation in a regular physical activity program contributes to the prevention of falling in older adults by strengthening lower limb and back muscles, enhancing postural reactions, and by improving gait, flexibility, mobility, and self-confidence in physical abilities (Spirduso, 1995). Many balance training exercises that target the muscular and sensory systems of older adults reduce fall frequency and improve postural stability, strength, reaction time, and body sway on firm and soft surfaces (Mazzeo et al., 1999). Physical activity programs, (including aerobics, strength training, flexibility, and balance exercises) also improve health, functional capacity, quality of life, and independence for older adults (Mazzeo et al., 1999).

In a group of healthy 75 to 90 year old individuals, balance training led to significant improvement in balance (Wolfson, Whipple, Derby, Judge, King, & Amerman, 1996). Hu and Woollacott (1994) studied the effects of ten, one-hour multi-sensory balance training sessions in older adults between the ages of 65 and 90 years.

The study's balance activities involved an individual standing on both a firm and a foam support surface, with eyes open or closed and head in neutral or extended position. Compared to the control group, participants in the training group made significant improvements in postural sway while standing on both foam and firm support, with their eyes closed and head extended (Hu & Woollacott, 1994).

Combined programs, especially those emphasizing multi-sensory training and balance specific activities may be more effective in improving balance than general exercise programs or those consisting of only aerobic, strength, or flexibility exercises. Researchers found a significant training effect among older adults using a global general exercise program that emphasized the vestibular system. Participants practiced standing on one leg while shaking their heads or closing their eyes, jogging, performing various trampoline exercises, and turning while walking (Ledin, et al. 1991). In another study, researchers used an eight-week training protocol of leg muscle strengthening exercises with progressively increased external loads among older adults who were 90 years of age. They reported significant improvements in strength and mass of the leg muscles and increased tandem gait speed and reduction in the use of assistive devices (Fiatarone, Marks, Ryan, Meredith, Lipsitz, & Evans, 1990).

Although older adult assisted-living residents are at a great risk for falling and deterioration of physical and functional abilities, this population has not been studied extensively to test the impact of balance training on fear of falling. There is also a limited amount of research addressing the use of dynamic and static balance for either firm or foam surfaces for improving mobility and balance or in treating fear of falling in assisted-living adult populations. In addition, the combination of a foam-balance training

program and assessment of fear of falling in assisted-living older adult populations has not been reported in the literature.

The purpose of this study was to investigate the impact of a four-week foam balance training program on fall-related self-efficacy in assisted-living older adults in a medium-sized city in the Southeastern United States. The researcher hypothesized that older adults who participated in the four-week foam-support balance training intervention would significantly improve balance and fear of falling. However, a result in either direction would be important to the researcher and was tested.

2. METHODOLOGY

SETTING & PARTICIPANTS

Fifteen facilities received written notification of the researcher's interest in using their facility for the study. However, only two responded with the willingness to permit the researcher to recruit within their facility. Therefore, the study was conducted in two private, urban assisted-living facilities in a medium-sized city in the Southeastern United States of America. Due to a limited amount of facility willingness to participate and the challenge of recruiting volunteers who fit the eligibility criteria, a total of fifteen assisted-living older adults volunteered their time to participate in a balance training program. It was the intent of the researcher to recruit twenty participants from each facility. However, for many older adults, the topics of falling and balance training create a sense of fear for the potential recruit. Therefore, recruitment for research is difficult in this population, because those potential participants who are most fearful are those least likely to volunteer for studies (Maki, 1997).

The procedures to protect human subjects in this study were reviewed and approved by The University of Tennessee, Knoxville Institutional Review Board. Assisted-living residents were recruited who (1) were 65 or more years old; (2) had no neurological or cognitive impairments; (3) had no pre-existing inner ear/vestibular impairments; (4) had no orthostatic hypotension; (5) had a resting blood pressure less than 160/90 mmHg; (6) had no limiting cardiorespiratory condition or recent joint replacement surgery within the past year; (7) had the ability to rise out of a chair; (8) had not suffered from a heart attack or stroke in the last six months; and (9) had their

physician's permission and/or recommendation to participate. The Director of Activities and Director of Nursing at each facility worked with the researcher and participant's physicians to identify prospective participants and who met the recruitment guidelines.

Recruitment meetings were held in the activity and social rooms. At the recruitment events, the researcher provided a set of forms – cover letter, informed consent, physician's cover note, and participant medical form – to each prospective participant. The consent form was signed by each participant and countersigned by whoever holds physical "power of attorney" for the participant, and returned along with the participant medical form (filled out and signed by the participant's family physician). Return of the consent and medical forms was coordinated by the researcher and Director of Activities. Participants in either group were not offered any incentive for participation in the study. To be counted in the study, participants had to complete a minimum of three weeks (75%) in the control/intervention group and both the pre- and post-test.

PROCEDURE

The researcher used a quasi-experimental pre-test/post-test design with an experimental group serving as the intervention group and a normal aging group serving as the control group. Facilities were randomly assigned to serve as either the control or intervention group. Assignment by facility rather than individual was used to reduce the possibility of contamination between groups since individuals socialized and interacted with each other at meals and during other activities. Participants (N = 8) from one

facility were assigned to serve as the control group and those (N = 7) from the other facility served as the intervention group.

Data collected for each participant included age, gender, use of assistive device, falls efficacy, and balance performance measures (single-leg stand, tandem stand, functional reach, and eight-foot up-and-go) at each assessment. Two assessments were made for each participant, one at baseline (pre-test) and one at the completion of the study (post-test). Results were recorded on the individual data sheet during the individual assessments. Each participant completed all assessments and intervention activities with no assistive device. All assessments were scheduled as individual appointments to insure confidentiality. Assessments took approximately one hour per participant to complete and were performed in the Activities Room. The researcher and an assistant worked with each participant to demonstrate and score the tests. The assistant served as the safety person, to ensure that the participant did not fall or get injured during testing. The team members were graduate students who were trained by the principal investigator to safely supervise correct performance of the exercise intervention.

Daily note cards and visits from the nursing staff were used to remind participants about their scheduled assessment and intervention sessions. To establish a routine and promote exercise adherence, sessions were scheduled at the same time and on the same day (s) during the entire intervention period.

INTERVENTION

The four-week intervention consisted of a low-level, non-invasive one-on-one balance training program consisting of five static and five dynamic balance exercises

using a two-and-a-half inch thick foam support surface. Supervised intervention was conducted twice a week for thirty minutes to one hour per session in the Activities Room. Each participant had one-on-one supervision for each training session. Participant blood pressure was checked at the beginning of the session followed by the stretching warm up, and balance training exercises. At the end of the session, each participant performed the cool down stretching activities and had their blood pressure checked again.

WARM-UP AND COOL-DOWN ACTIVITIES

The warm-up consisted of each participant taking three deep breaths with a three second hold, completing eight activities for ten repetitions while being seated in a chair, and then once again, taking three deep breaths with a three second hold. The cool down was performed in the same manner, except each activity was performed for five repetitions. The activities of the general dynamic warm-up and cool down were: ankle circles, ankle flexion and extension, marching in place, alternate leg extension, lower back and chest stretch, arm circles, shoulders rolls, and three position neck rotations.

STATIC BALANCE ACTIVITIES

Static balance activities included plantar flexion, hip extension, hip flexion, knee flexion, single-leg stand, and side leg raise. All exercises were performed standing on either the preferred leg or both legs, depending on the individual's ability, with participants stabilizing their position by holding onto the back of a chair. Spinal alignment was emphasized during these activities to encourage improved posture to increase lumbar lordosis, decrease thoracic kyphosis, keep the head straight, tighten abdominal muscles, and decrease forward lean. To increase the difficulty of each

exercise, participants progressed from a two hand touch on the back of the chair to a one hand touch, one fingertip touch, no hands eyes open position, and no hands eyes closed position. As participants progressed through the program, the number of sets increased from a single set of thirty seconds in the beginning to two sets of thirty seconds, for each balance exercise.

DYNAMIC BALANCE ACTIVITIES

Dynamic balance activities followed, requiring the participants to alter the size of their base of support and increase awareness of the position of their feet during tandem walking forward and backward, walking sideways, braid walking, and circle walking. All walking exercises were performed over a six-foot distance. These exercises emphasized the ability to shift bodyweight from a variety of moving positions while still maintaining balance. Each participant was encouraged to properly lift their feet off of the floor during sideways and circular movements, versus drag their feet across the mat, and to walk heel to toe or toe to heel during forward and backward movements, respectively. Participants were also encouraged to keep their head and back straight and tighten their abdominal muscles during all movements. To increase the difficulty of each exercise, participants were encouraged to perform each maneuver with their eyes closed. As participants progressed through the program, the number of sets increased from a single set of ten repetitions in the beginning to two sets, for each balance exercise.

MEASUREMENTS

FEAR OF FALLING

Fall-related self-efficacy was assessed using the Falls Efficacy Scale (FES) developed by Tinetti (Tinetti et al., 1990; Tinetti et al., 1993; Tinetti et al., 1994). The FES assessed fear of falling in older adults when performing activities of daily living. It consisted of a ten item self-report survey with Likert scales measuring fear of falling by examining a person's self-confidence in his or her ability to avoid falling while performing everyday activities (i.e. cleaning house, getting dressed, simple shopping). Participants ranked each item from "1" indicating "not at all concerned" to "4" indicating "very concerned". If respondents indicated that they did not perform or were unable to perform the activity, they were encouraged to respond hypothetically (Kressig, Wolf, Sattin, O'Grady, Greenspan, Curns, & Kutner, 2001). Upon completion of the FES, the results were aggregated into a composite score and analyzed as the overall perceived falls efficacy (Cumming et al., 2000; Tinetti et al., 1990; Tinetti et al., 1993; Tinetti et al., 1994).

Lower scores on the falls efficacy scale revealed greater balance confidence. The FES has good internal consistency (=.91), test-retest reliability (r = .71), and construct validity (=.70) (Cumming et al., 2000). The FES score is significantly associated with difficulty getting up after a fall, anxiety trait, general fear score, and several measures of balance and gait (Tinetti et al., 1990).

BALANCE INSTRUMENTS

Measurements for balance included “single-leg” stand with eyes open, “tandem” stand, “functional reach”, and the “eight-foot up-and-go” (Duncan, Weiner, Chandler, & Studenski, 1990; Rikli & Jones, 1999; Rogers, Rogers, Takeshima, & Islam, 2003). Each test required two trials. Both test trials were recorded on the individual data sheet, and the best was recorded as the score. Higher scores for the single-leg stand with eyes open, tandem stand, and functional reach indicated greater balance, while lower scores for the eight-foot up-and-go test also measured greater balance. All balance measurements were assessed as time in seconds, except for functional reach which was measured in inches. The same individual performed all measurements and ratings on all participants to eliminate interrater bias.

SINGLE-LEG STAND

For the single-leg stand, the participant stands on the preferred foot while resting the hands at waist level and then raises the other foot approximately ten centimeters off the floor. Balance is scored as the number of seconds the foot is kept raised or until balance is lost. Timing is terminated when the participant touches the raised foot to the floor, removes their hands from the hips, moves the supporting foot from the original starting position, or hooks the raised leg behind the support leg (Rogers at al., 2003). The single-leg balance measure has a test-retest reliability of .96 (Franchignoni, Martino, Ricupero, & Tesio, 1998).

TANDEM STAND

The tandem stand is measured by having the participant stand with the heel of one foot directly in front of and touching the toes of the other foot. Balance is scored by the number of seconds the participant can remain in that position or until balance is lost. Timing is terminated when the participant moves from the tandem position or touches any object with his/her hand to maintain balance (Rogers et al., 2003). The tandem stand has a test-retest reliability of .95 (Franchignoni et al., 1998).

FUNCTIONAL REACH

Functional reach is a measure of the maximal distance an individual can reach forward beyond an arm's length while maintaining a fixed base of support in a balanced and standing position. The functional reach is measured in inches, as the difference in reach from the starting to final position (Duncan, Chandler, Prescott, & Studenski, 1992). Researchers showed that if participants were unable to reach a certain distance than they were more likely to fall; if their reach was less than or equal to six inches, the OR was 4.02; and if the reach was greater than six inches but less than ten inches, the OR was 2.00 (Duncan et al., 1992). The functional reach measure has a test-retest reliability of .89 (Sherrington & Lord, 2005).

EIGHT-FOOT UP-AND-GO

Eight-foot up-and-go is a measure of walking speed, agility, and dynamic balance (Rikli & Jones, 1999). An eight-foot course is set up with a chair at one end and a cone at the other. The individual gets up from the chair, walks toward and around the cone, returns to the chair and sits down. This is timed and recorded in seconds. The actual

score is recorded as the best of three trials (Rikli & Jones, 1999). The eight-foot up-and-go test has an inter-tester and intra-tester reliability of .95 (Steffen, Hacker, Mollinger, 2002). Researchers noted that older adults who required 6.9 seconds or longer to complete this test were classified as fallers with an 82% prediction rate (Rose, Jones, & Lucchese, 2002).

DATA ANALYSIS

The main study outcomes were falls efficacy and the following balance measures - single-leg stand, tandem stand, functional reach, and eight-foot up-and-go. Data were collected for all variables at baseline and upon completion of the four-week intervention and normal aging period. All analyses were conducted using SPSS 14.0 for Windows (SPSS Inc., Chicago, IL.). Independent samples t-tests were used to examine between group differences in pre-test scores (falls efficacy scale, single-leg stand, tandem stand, functional reach, and eight-foot up-and-go) to determine the similarity of groups prior to intervention implementation. Chi square analysis was used to examine the differences between groups in the use of assistive devices throughout the study period.

Analysis of covariance (ANCOVA) was used to determine between group differences in post-test scores of the falls efficacy scale, single-leg stand, tandem stand, functional reach, and eight-foot up-and-go, when controlling for pre-test differences. To examine the effect of group membership on each post-test balance training assessment, when controlling for that measure, the score was entered into the regression equation first, group membership was added to the equation next, and the pretest x group product

term was entered last. Non-directional hypotheses were tested since a result in either direction would be important to the researcher. A significance level of $\alpha = .05$ was used to indicate statistical significance for all analyses. Descriptive information on age, gender, and use of assistive devices throughout the study were collected and used to further define the sample populations.

3. RESULTS

SAMPLE CHARACTERISTICS

There were six females and two males in the control group, ranging in age from 79 to 86 years (M = 83, SD = 3.52). In the intervention group, there were three females and four males, who ranged in age from 86 to 93 years (M = 89, SD = 2.73).

STUDY RESULTS

The maximum level of training achieved by the intervention group was the completion of all static and dynamic balance exercises with no hand support. Each participant also performed each exercise for two sets of thirty seconds in length (static balance exercises) and ten repetitions (dynamic balance exercises), with a one minute rest between sets.

There were no statistically significant differences in the falls efficacy scores, balance performance measures, and the use of assistive devices between the control and intervention groups at baseline. The mean falls efficacy score for the intervention group (M = 18.43, SD = 9.13) was higher than the mean falls efficacy score for the control group (M = 12.25, SD = 2.87, t (13) = -1.82, p = .09, two-tailed, 95% CI = -13.50 to 1.14).

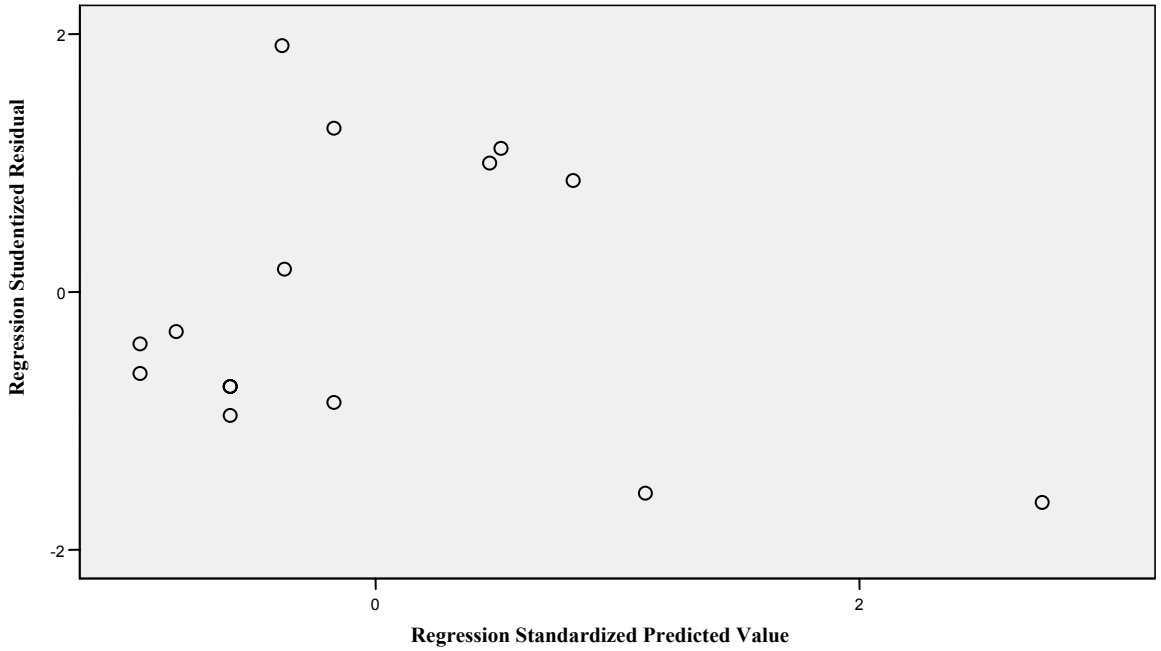
Comparing scores for the single-leg stand for the intervention group (M = 4.78, SD = 5.86) and the control group (M = 8.02, SD = 10.60), indicates that intervention scores were lower, but this difference was not statistically significant (t (13) = .717, p = .49, two-tailed, 95% CI = -6.5 to 13.00). Mean tandem stand score for the intervention group (M = 202.43, SD = 217.20) was higher than the

mean tandem stand score for the control group (M = 120.24, SD = 135.30), but this difference was not statistically significant (t (*13*) = -.893, p = .39, two-tailed, 95% *CI* = -281.04 to 116.67). The mean functional reach score for the control group (M = 9.68, SD = 2.00) was higher than for the intervention group (M = 9.10, SD = 2.47). Again, this difference was not statistically significant (t (*13*) = .509, p = .62, two-tailed, 95% *CI* = -1.90 to 3.08). For the eight-foot up-and-go, the mean score for the intervention group (M = 15.79, SD = 9.63) was higher than that for the control group (M = 15.11, SD = 7.69). This difference was not statistically significant (t (*13*) = -.152, p = .88, two-tailed, 95% *CI* = -10.33 to 8.97).

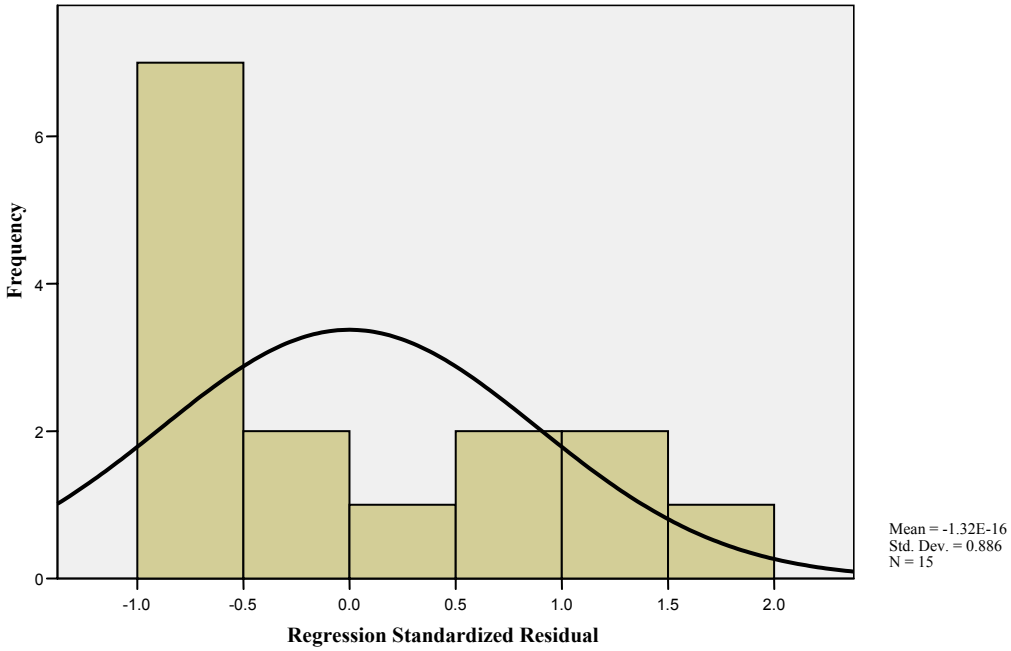
Results indicated that both groups (control and intervention) had the same number of participants with either no assistive device (N = 4) or the use of a cane (N = 1) ([50% vs. 57.1%, X^2 (2, N = 15) = .134, p = .93]); [12.5% vs. 14.3%, X^2 (2, N = 15) = .134, p = .93]). However, more participants in the control group used a walker than those in the intervention group (N = 3 vs. N = 2) [37.5% vs. 28.6%, X^2 (2, N = 15) = .134, p = .93], although this was not significant.

FALLS EFFICACY

An examination of the scatterplot of the studentized residuals with the standardized predicted values of post-test falls efficacy scores did indicate a possible problem with homoscedasticity (Figure 1). The histogram of the residuals did suggest a negatively skewed distribution (Figure 2).



- Figure 1 - Scatterplot Of Post-Test Falls Efficacy Scores



- Figure 2 - Histogram Of Post-Test Falls Efficacy Scores

There was no statistically significant difference in mean pre-test confidence level between the control and intervention groups. Table 1 shows a strong positive relationship between pre-test and post-test confidence $R^2 = .63$, $F(1, 13) = 8.72$, $p \leq .05$, two-tailed) and no statistically significant interaction between group membership and pre-test balance confidence (The pre-test-adjusted post-test mean confidence level for the intervention group ($M = 13.82$) was less than for the control group ($M = 16.73$), but this difference was not statistically significant.

SINGLE-LEG STAND (BALANCE 1)

An examination of the scatterplot of the studentized residuals with the standardized predicted values of the single-leg stand scores did indicate a possible problem with homoscedasticity (Figure 3). The histogram of the residuals did suggest a negatively skewed distribution (Figure 4).

As shown in Table 2, there is not a statistically significant relationship between pre-test and post-test balance 1 scores ($R^2 = .37$, $F(1, 13) = 2.07$, $p \leq .05$, two-tailed). A statistically significant interaction between group membership and pre-test balance 1 scores was found (Figure 5). The pre-test-adjusted post-test mean single-leg stand score for the intervention group ($M = 5.50$) was higher than that of the control group ($M = 3.35$), but this difference was not statistically significant.

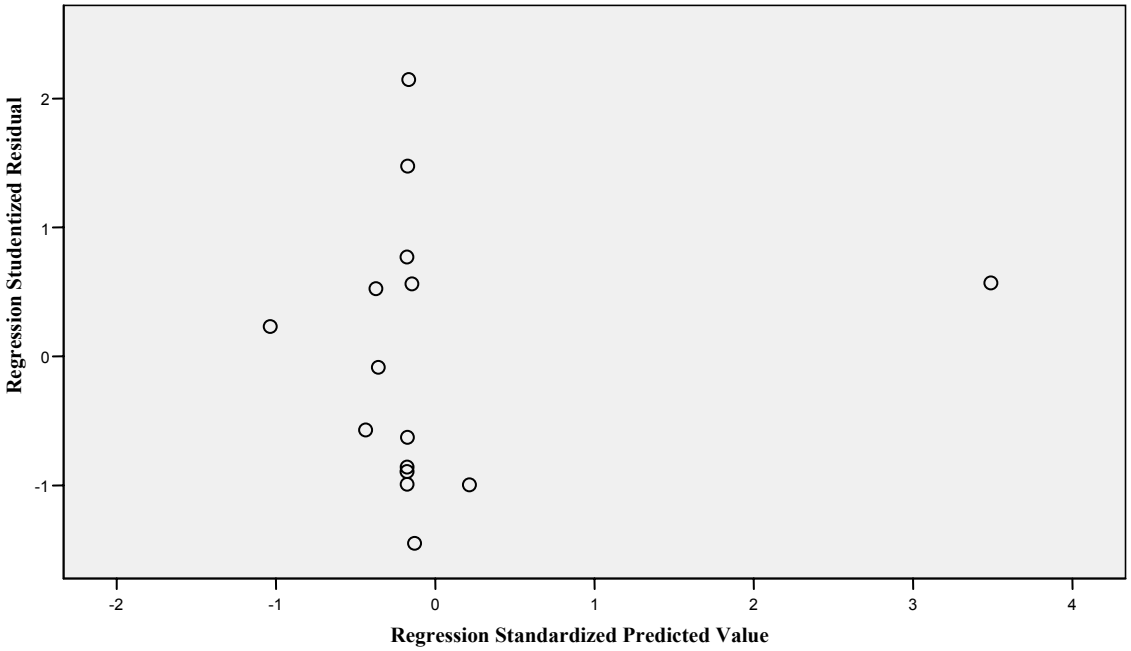
Table 1

Regression Analysis For Predicting Post-Test Falls Efficacy

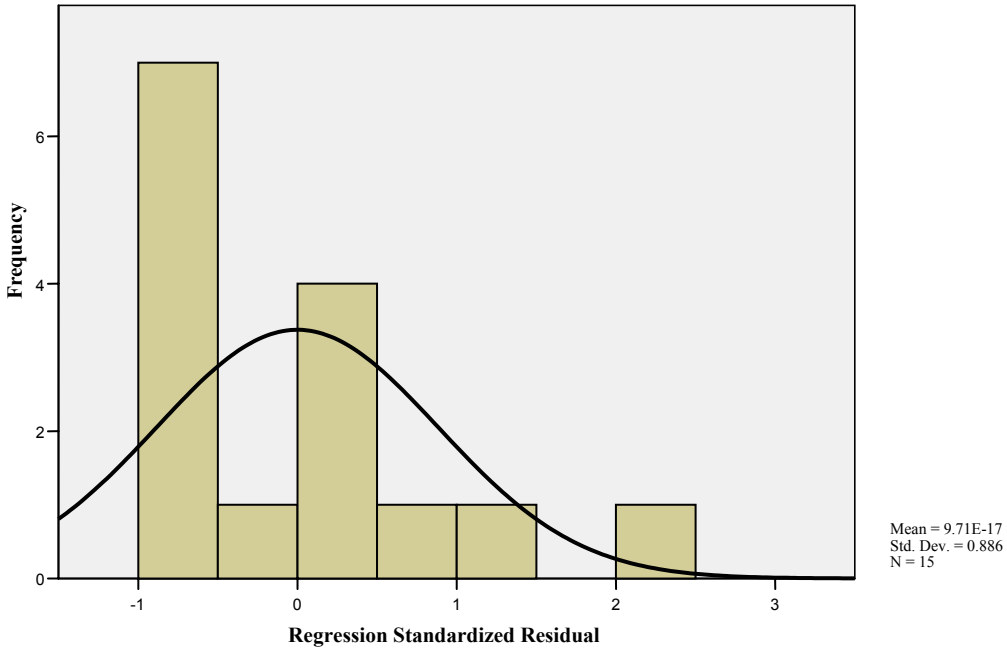
Variable	*USB*	*SE B*	*SB*	R^2	ΔF
Step 1					
Pretest FESB	.54	.18	.63*	.63*	8.72*
Step 2					
Group[a]	-2.91	2.81	-.25	.67	1.10
Step 3					
Pretest FESB x group	-.27	.70	-.50	.68	.15

[a]Group: 0 = *control*, 1 = *intervention*.

*$p \leq .05$. **$p \leq .01$.



- Figure 3 - Scatterplot Of Post-Test Single-Leg Stand Scores



- Figure 4 - Histogram Of Post-Test Single-Leg Stand Scores

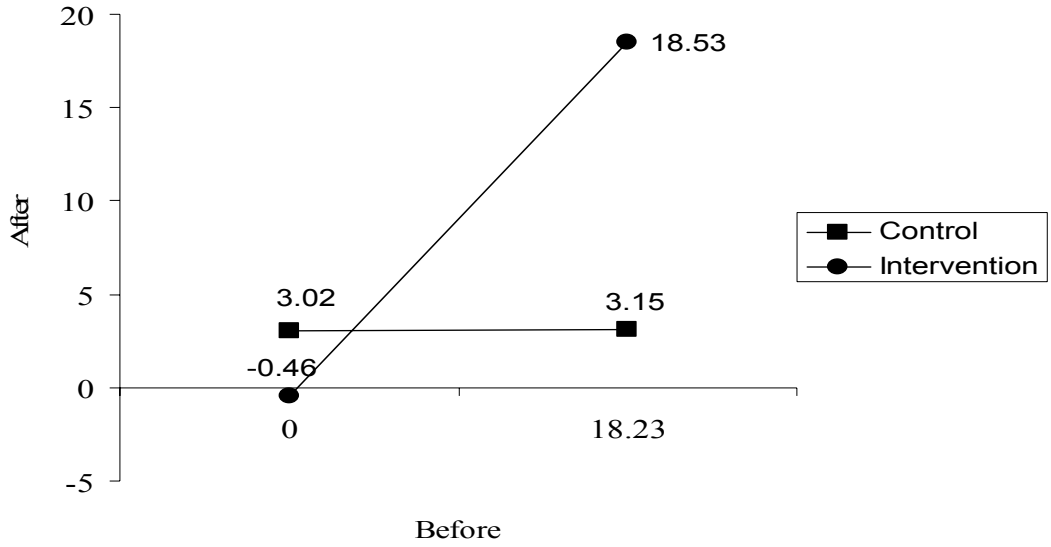
Table 2

Regression Analysis For Predicting Post-Test Single-Leg Stand

Variable	*USB*	*SE B*	*SB*	R^2	*ΔF*
Step 1					
Pretest Bal1	.20	.14	.37	.37	2.07
Step 2					
Group[a]	2.16	2.32	.24	.44	.86
Step 3					
Pretest Bal1B x group	1.03	.18	1.04**	.89**	33.0**

[a]Group: 0 = *control*, 1 = *intervention*.

*$p \leq .05$. **$p \leq .01$.



- Figure 5 – Interaction Of Single-Leg Stand Scores

TANDEM STAND (BALANCE 2)

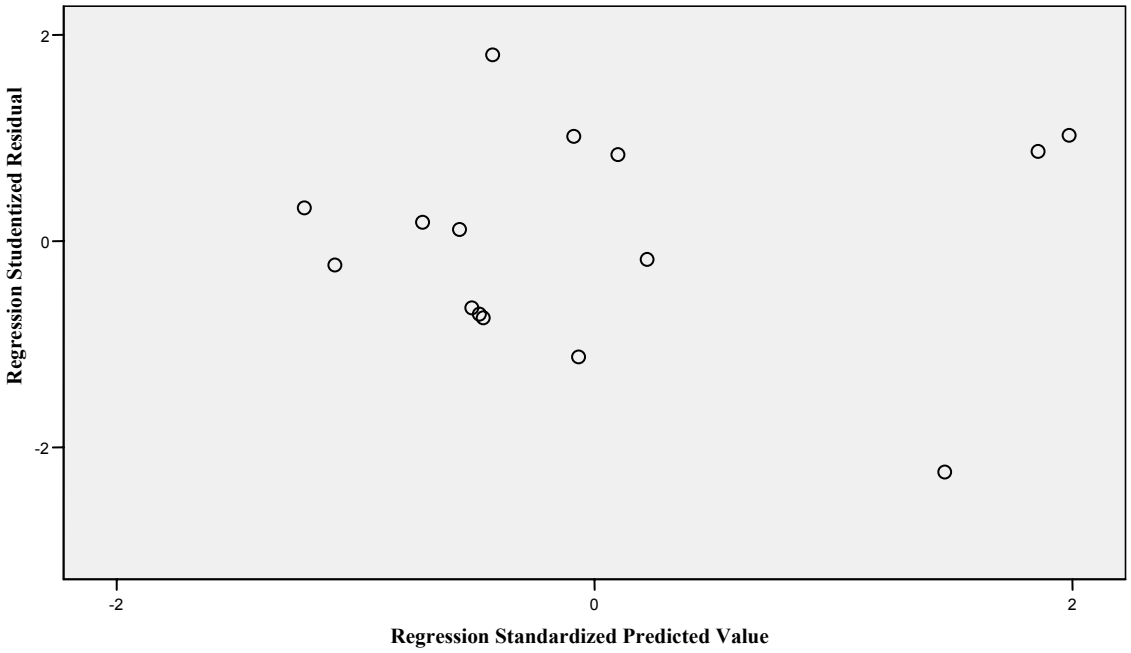
An examination of the scatterplot of the studentized residuals using with the standardized predicted values of the tandem stand scores did indicate a possible problem with homoscedasticity (Figure 6). The histogram of the residuals did not suggest any serious violation of the normality assumption (Figure 7).

Table 3 shows that there was not a statistically significant relationship between pre-test and post-test balance 2 scores ($R^2 = .34$, $F\ (1, 13) = 1.70$, $p \leq .05$, two-tailed). No statistically significant interaction between group membership and pre-test balance 2 scores occurred. The pre-test-adjusted post-test mean tandem stand score for the intervention group ($M = 308.55$) was higher than that of the control group ($M = 171.73$), but was not statistically significantly different.

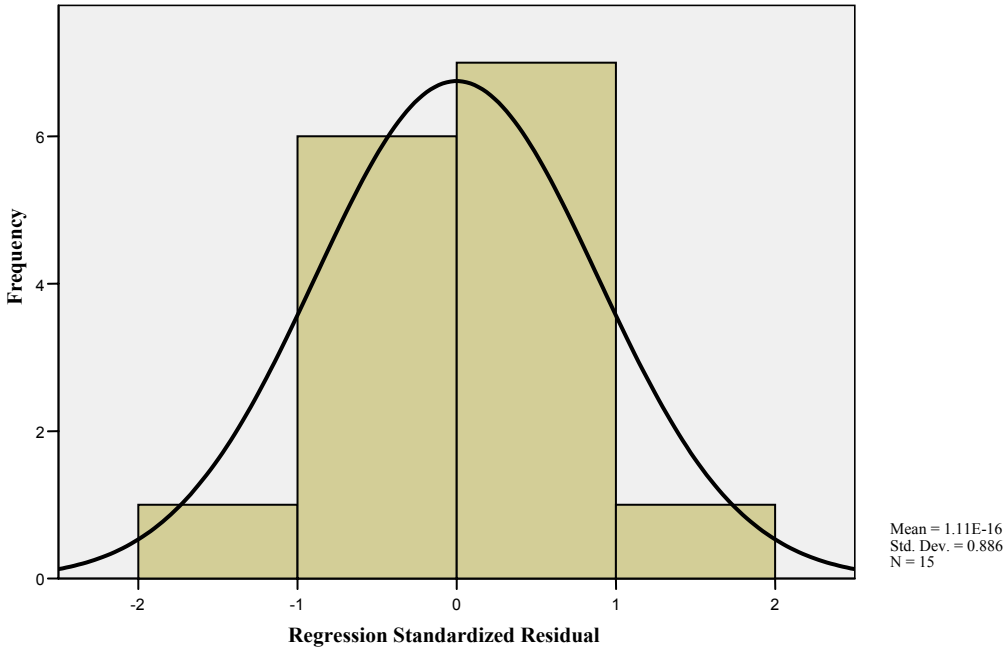
FUNCTIONAL REACH (BALANCE 3)

An examination of the scatterplot of the studentized residuals with the standardized predicted values of the functional reach scores did indicate a possible problem with homoscedasticity (Figure 8). The histogram of the residuals did not suggest any serious violation of the normality assumption (Figure 9).

A strong positive relationship between pre-test and post-test balance 3 scores was found, as shown in Table 4 ($R^2 = .65$, $F\ (1, 13) = 9.93$, $p \leq .01$, two-tailed). No statistically significant interaction occurred between group membership and pre-test balance 3 scores. The pre-test-adjusted post-test mean functional reach score for the intervention group ($M = 11.40$) was higher than that for the control group ($M = 10.34$), but was not statistically significant.



- Figure 6 – Scatterplot Of Post-Test Tandem Stand Scores



- Figure 7 – Histogram Of Post-Test Tandem Stand Scores

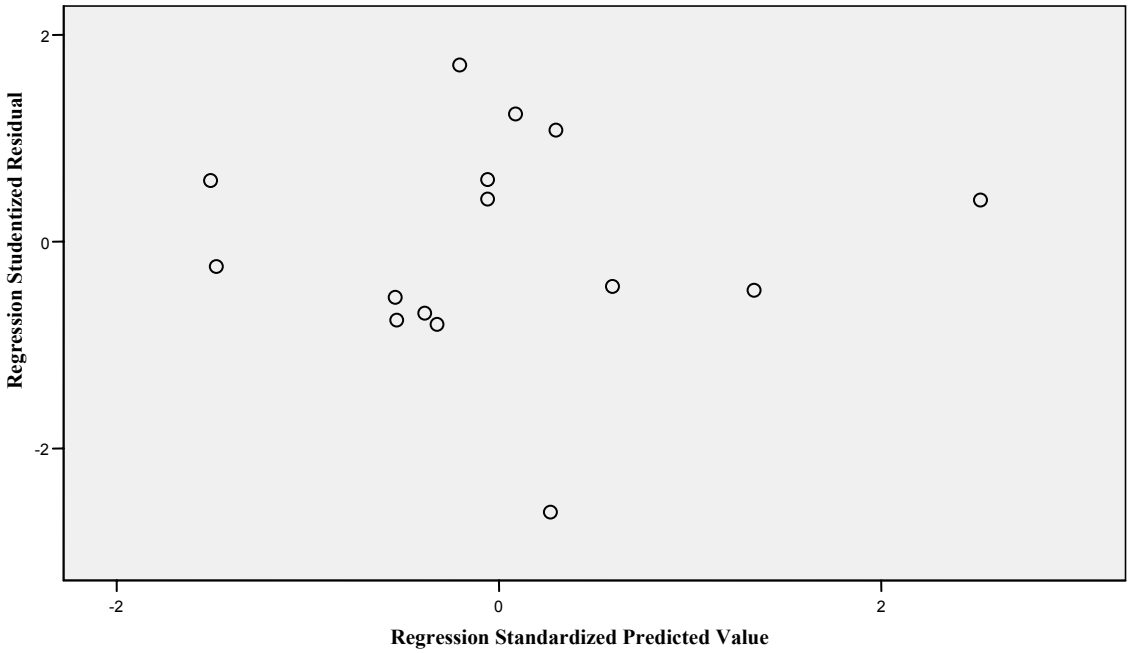
Table 3

Regression Analysis For Predicting Post-Test Tandem Stand

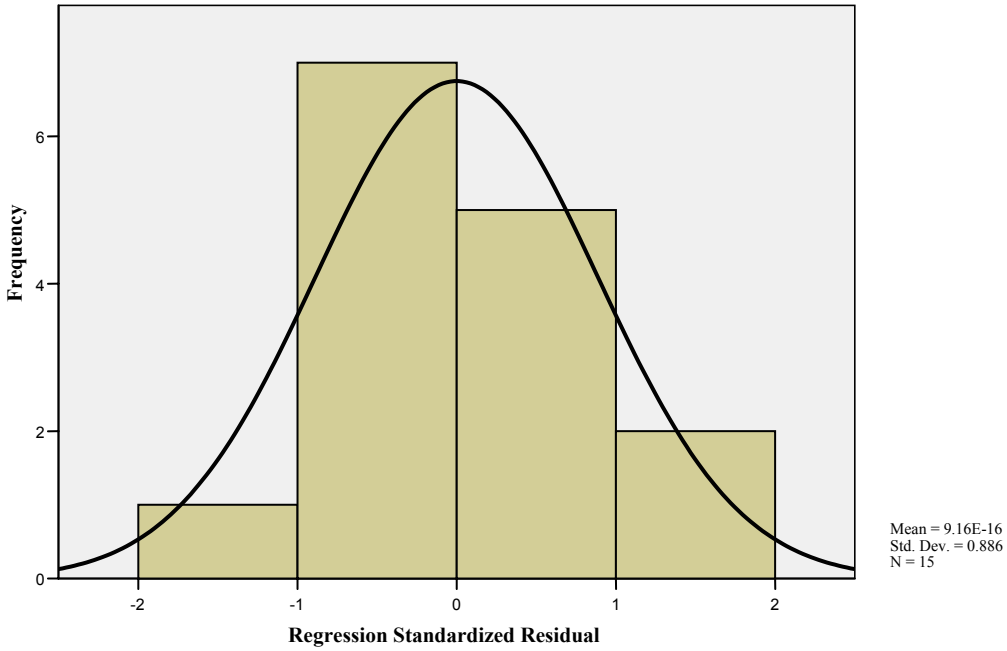
Variable	*USB*	*SE B*	*SB*	R^2	*ΔF*
Step 1					
Pretest Bal2	.34	.26	.34	.34	1.70
Step 2					
Group[a]	136.82	87.82	.40	.51	2.42
Step 3					
Pretest Bal2B x group	.70	.54	.70	.60	1.71

[a]Group: 0 = *control*, 1 = *intervention*.

*$p < .05$. **$p \leq .01$.



- Figure 8 – Scatterplot Of Post-Test Functional Reach Scores



- Figure 9 – Histogram Of Post-Test Functional Reach Scores

Table 4

Regression Analysis For Predicting Post-Test Functional Reach

Variable	*USB*	*SE B*	*SB*	R^2	ΔF
Step 1					
Pretest Bal3	.65	.20	.66**	.65**	9.93**
Step 2					
Group[a]	1.05	.85	.26	.70	1.53
Step 3					
Pretest Bal3B x group	.76	.36	1.78	.80	4.49

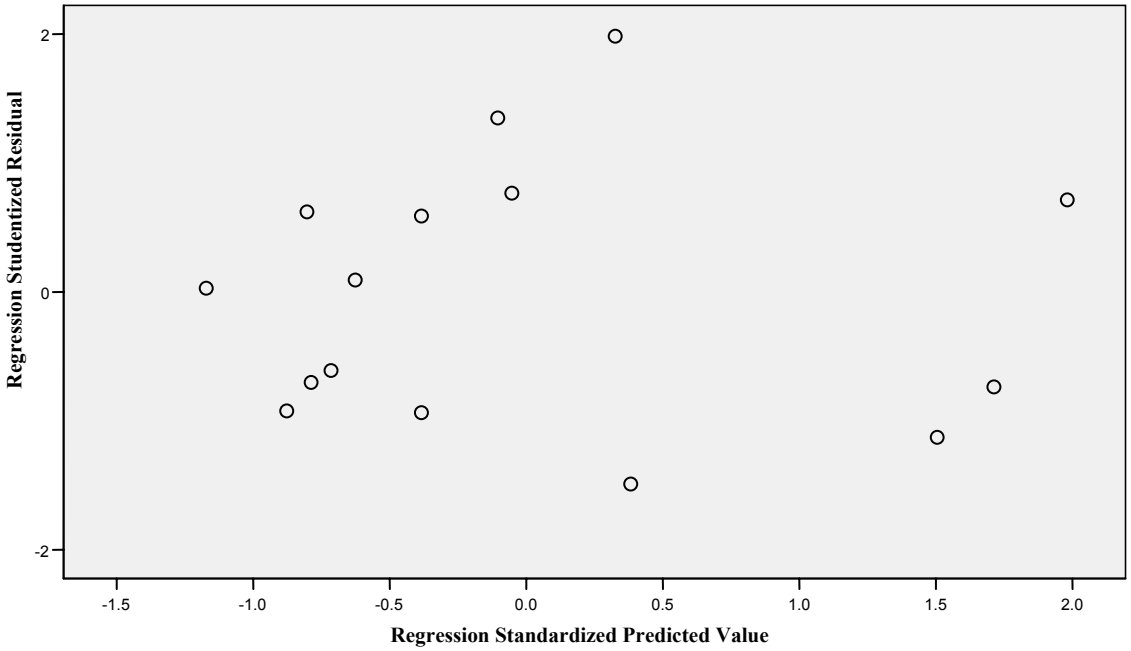
[a]Group: 0 = *control*, 1 = *intervention*.

*$p \leq .05$. **$p \leq .01$.

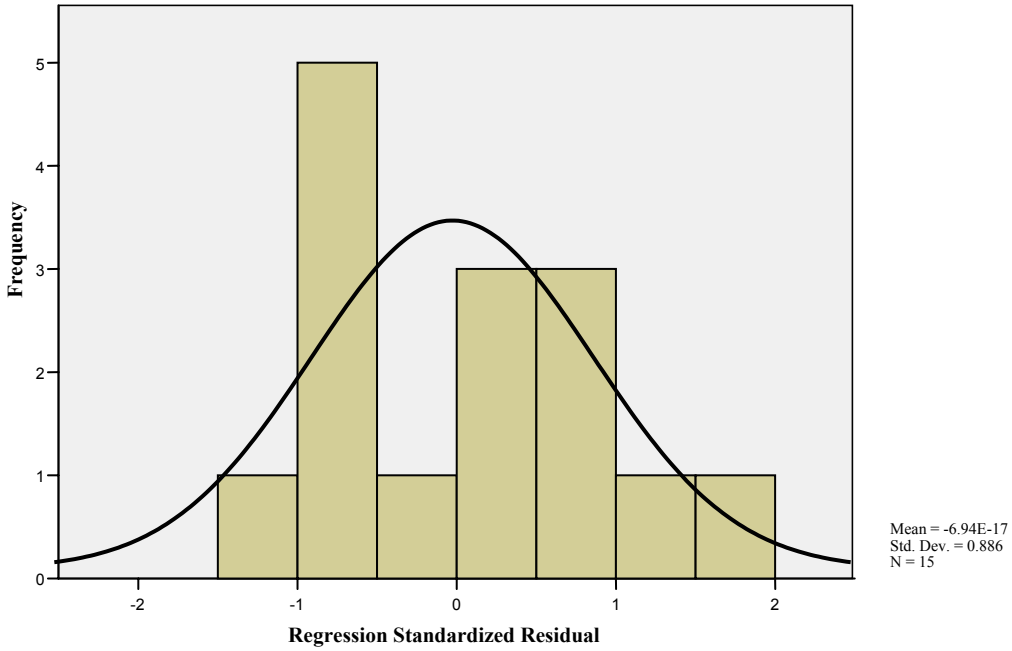
EIGHT-FOOT UP-AND-GO (BALANCE 4)

An examination of the scatterplot of the studentized residuals with the standardized predicted values of the eight-foot up-and-go scores did indicate a possible problem with homoscedasticity (Figure 10). The histogram of the residuals did suggest a positively skewed distribution (Figure 11).

As shown in Table 5, there was a strong positive relationship between pre-test and post-test balance 4 scores ($R^2 = .92$, $F\ (1, 13) = 76.93$, $p \leq .01$, two-tailed). There was not a statistically significant interaction between group membership and pre-test balance 4 scores. The pre-test-adjusted post-test mean eight-foot up-and-go score for the intervention group ($M = 11.81$) was lower than for the control group ($M = 12.3$), but this difference was not statistically significant.



- Figure 10 – Scatterplot Of Post-Test Eight-Foot Up-and-Go Scores



- Figure 11 - Histogram Of Post-Test Eight-Foot Up-and-Go Scores

Table 5

Regression Analysis For Predicting Post-Test Eight-Foot Up-and-Go

Variable	*USB*	*SE B*	*SB*	R^2	ΔF
Step 1					
Pretest Bal4	.66	.07	.92**	.92**	76.93**
Step 2					
Group[a]	-.49	1.25	-.043	.93	.15
Step 3					
Pretest Bal4B x group	-.28	.14	-.50	.95	4.15

[a]Group: 0 = *control*, 1 = *intervention*.

*$p \leq .05$. **$p \leq .01$.

4. DISCUSSION

Contrary to the hypothesis, older adults who participated in the four-week foam-support balance training intervention did not significantly improve balance and fear of falling. There was no detectable difference between the groups, in terms of age, female-to-male ratio, and pre-test scores for falls efficacy, single-leg stand, tandem stand, functional reach, and eight-foot up-and-go and a lack of statistical significance was found for all measurements, except the single-leg stand.

The improvements in pre-test-adjusted post-test mean scores for single-leg stand, tandem stand, functional reach, and eight-foot up-and-go may suggest that balance improved using a foam-support balance training program. Although not statistically significant, it is worth noting that the pattern of the mean scores for the falls efficacy scale and four functional balance performance measures were in the hypothesized direction and are consistent with those reported in the research.

In all cases the direction of the pre-test-adjusted between group post-test differences supported the effectiveness of the intervention. However, given the small sample size used in this study it was only possible to detect very large between-group differences with sufficient statistical power. Consequently, the failure to detect statistically significant post-test differences may be due to insufficient statistical power to detect obtained effect sizes, which ranged from .01 to .17 as quantified by the change in R^2 upon entry of the group membership variable.

Findings suggest that older adults who participated in the four-week foam-support balance training intervention may have reduced their fear of falling and improved their balance confidence. Researchers (Myers, Powell, & Maki, 1996) found similar results in

their three-month investigation of the association between balance confidence and balance performance in community dwelling elderly people. Participants with higher balance confidence demonstrated less postural sway in standing than participants with lower balance confidence (Myers et al., 1996). Researchers also noted that older adults who participated in fear of falling interventions of at least four weeks in duration had increased levels of activity and a reduction in greater physical dysfunction (Tennstedt, Howland, Lachman, Peterson, Karsten, & Jette, 1998).

The finding of improved falls efficacy, single-leg stand, functional reach, and tandem stand scores may suggest that older adults can improve their balance after completing a four-week balance program. Hu and Woollacott (1994) had similar findings when twelve participants in the training group made significant improvements in postural sway while performing the single-leg stand on both foam and firm support, with eyes closed and/or head extended compared to the twelve members of the control group following a four-week intervention. In another study, researchers also found that intervention participants made significant improvements in single-leg stand with eyes open/closed, single-leg stand with head rotation, and thirty-meter walk compared to the control group for older adults aged 70 to75 years following a nine-week balance training program (Kronhed, Moller, Olsson, & Moller, 2001). A study of 256 community dwelling older adults showed that a six-month balance training program was effective in improving fear of falling, single-leg stand, functional reach, and physical performance (Li, Harmer, Fisher, McAuley, Chaumeton, Eckstrom, & Wilson, 2005).

Improved eight-foot up-and-go scores are consistent with those reported by Rose and colleagues (Rose, Jones, & Lucchese, 2002). They noted that older adults who required 6.9 seconds or longer to complete this test were classified as fallers with an 82% prediction rate (Rose, Jones, & Lucchese, 2002). This finding may suggest that if older adults who participated in the balance training intervention trained for longer than four weeks they may be less likely to fall.

LIMITATIONS

The current study is primarily limited by its small overall and individual group sample size. Although the results were similar to the current trends in the literature, the results of the study were not significant. The study also had a disproportionate number of females to males. When conducting research with older adults this limitation is common, because females have longer life expectancies than males (Rogers et al., 2003). The sampling procedure is another limitation of this study. Participants in the assisted-living communities are self-selected, not randomly selected, and there is likelihood that residents living in these care facilities are not typical of the general population. The selection of only two facilities to serve as the control and intervention group also limited the current study.

Other limitations can also be identified. Data only include individuals in this study who are Caucasian because of the limited racial/ethnic diversity present in both facilities in this study. Due to time constraints, the length of the intervention has been limited to four weeks, and many of the previously cited studies were five or more weeks in length. The eligibility criteria limited the amount of potential recruits within each

facility. Each of these limitations precludes generalizing the results to all long-term care residents.

5. CONCLUSIONS

The researcher hypothesized that older adults who participated in the four-week foam-support balance training intervention would significantly improve balance and fear of falling. Results suggest that the older adults who participated in the four-week foam-support balance training program may have reduced their fear of falling and improved their balance. However, there was no detectable difference between the groups and a lack of statistical significance for all measurements, except single-leg stand was found.

Although a relatively small sample size (N = 15) limited the statistical significance of the present study, it does not diminish the importance of its findings. It is worth noting that the patterns of the scores were consistent with those reported in the literature. This relationship has important implications for the development of balance training programs that aim to improve falls self-efficacy and diminish its impact on function in older adults living in assisted-living communities.

RECOMMENDATIONS FOR FUTURE RESEARCH

Areas in which future studies can further highlight the association identified in the current study include the following:

1) Increasing the length of time (weeks) of the intervention.
2) Increasing the number of participants for more power in results.
3) Increasing the number of facilities to serve in the intervention and control groups.
4) Collecting falls efficacy and balance performance measures at multiple points over a period of time.
5) Measure the number of falls each participant experiences throughout the study.

6) Assessing falls efficacy and balance performance measures of older adults from diverse cultural identities.

7) Collecting qualitative data (interviews) about falls efficacy and activities of daily living at multiple points over a period of time.

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APPENDICES

APPENDIX A

REVIEW OF THE LITERATURE

BACKGROUND

Aging is often portrayed as a time of inactivity, unimportance, and boredom. It is this misperception that continues to foster ageism in society. Currently, 12% of the population is 65 years of age or older. By 2020, individuals 65 years and older are expected to reach 16.3% of the population. In 2050, that percentage will increase to 20.7%, with 5.0% being 85 years of age and older, many of whom will need to be admitted into long-term care facilities (Administration on Aging, 2004 (AoA)). This "age wave" is the result of 77.7 million baby boomers (born between the years 1946 – 1964) joining the ranks of older adults (MetLife, 2003).

At the beginning of the 20th century, the primary threat to mortality was infectious disease (Dychtwald, 1999). Today, chronic disease is the main threat to mortality (Dychtwald, 1999). The majority of the mortality from chronic disease has been the result of negative lifestyle factors, mainly the use of tobacco, physical inactivity, and poor nutrition. In 2000, persons reaching age 65 had an average life expectancy of an additional 17.9 years (19.2 years for females (84 years) and 16.3 years for males (81 years) (AoA, 2004). Despite the numerous advancements our society has made in increasing longevity, older adults are not necessarily healthier. Community health professionals, physicians, nurses, physical therapists and other public health personnel need to develop strategies that not only promote longevity, but also aid in the compression of morbidity.

FALL INCIDENCE

Falls are the primary cause of death for those aged 80 and over (National Safety Council, 2000). For persons 55 – 79 years old, falls are the second most common cause of death resulting from unintentional injuries (National Safety Council, 2000). Falls among older adults and the resultant injuries are a major concern from the perspective of health care costs. In addition, falls also pose a concern due to the psychological and social factors associated with restricted functional mobility, physical dependence, and potential lifestyle changes (Woolley, Czaja, & Drury, 1997).

An estimated 45% of adults over the age of 65 years will experience at least one fall per year, with more than 210,000 hip fractures annually in the US (Lindsay, 1995; Gryfe, Amies, & Ashley, 1977). Falls also cause 90% of hip fractures in the United States (US), resulting in costs of approximately ten billion dollars (Carter, Kannus, & Khan, 2001). Approximately 50% of people who fall and break their hips are never functional walkers again (Spirduso, 1995). Women fall more frequently than men, but men have a higher mortality rate (Nickens, 1985), resulting from a fall. At least 40% of older assisted-living residents fall annually, with a mean incidence rate of 1.5 falls per bed per year (Nygaard, 1998).

RISK FACTORS

Risk factors for falling are classified as intrinsic or extrinsic. Intrinsic factors are internal to the individual. Increased age, a history of falls, impaired balance, poor muscle strength, and various age-related physiologic changes and chronic conditions of various body systems, particularly cardiovascular and neurological conditions are examples of

intrinsic risk factors (Davis, Ross, Nevitt, & Wasnich, 1999; Mustard & Mayer, 1997; Tinetti & Williams, 1998).

Craik (1989) suggests that the cause of falls can be divided into two categories: (1) the stimulus that results in the loss of balance; and (2) the inability of the older adult to correct for the unexpected loss of balance. Examples of stimuli that can cause falling are dizziness, fainting, the use of medication, or uneven surfaces. The inability to correct for an unexpected loss of stability results from elements of the normal aging process, such as decreased reaction time, diminished central nervous system integration, decreased strength, bone density loss, and loss of joint mobility (Spirduso, 1995). In addition to being a consequence of falling, fear of falling has been identified as an intrinsic risk factor for falling (Baloh, Jacobson, Enrietto, Corona, & Honrubia, 1998). There is evidence that falls efficacy, the confidence that an individual has to do daily activities without falling, is an important factor to consider in fall prevention efforts (Tinetti, Richman, & Powell, 1990).

Extrinsic risk factors for falling are those environmental hazards that increase the chances of falling such as presence of throw rugs, low lighting, and slippery floors (North American Nursing Diagnosis Association, 2001; Schoenfelder, 2000). The way older persons function in and interact with their environments also affects their safety. One study suggested that those who are distracted by doing a familiar, manual task along with functional maneuvers are more apt to fall (Lundin-Olsson, Nyberg, & Gustafson, 1998).

Although some falls have a single cause, the majority of falls result from interactions between long-term or short term predisposing factors and short-term precipitating factors in a person's environment (Nevitt, Cummings, Kidd, & Black, 1989,

1991; Sattin, 1992; Tinetti, Doucette, Claus, Marottoli, 1995; Tinetti, Speechley, & Ginter, 1988). Each of the following conditions has been shown to increase the subsequent risk of falling in two or more observational studies: arthritis; depressive symptoms; orthostatis; impairment in cognition, vision, balance, gait, or muscle strength; and the use of four or more prescription medications. The risk of falling consistently increases as the number of these risk factors increases (Tinetti et al., 1988; Nevitt et al., 1989). For example, in a cohort of elderly persons living in the community, the risk of falling increased from 8% among those with no risk factors to 78% among those with four or more risk factors (Tinetti et al., 1988).

PHYSICAL FUNCTION

Healthy aging is an individual's ability to maintain three key behaviors: low risk of disease or disease related disability, active engagement in life, and high mental and physical function (Rowe & Kahn, 1998). The loss of muscle strength, decreased flexibility and range of motion, and decreased sense of balance result from aging and contribute to falls, as well as functional decline (Burbank, Reibe, Padula, & Nigg, 2002). Hence, functional decline affects an individual's quality of life, often leading to dependency due to the resulting disability, loss of physical function, and lack of social interaction.

Disability refers to limitations in performance of social roles and tasks in the context of the socio-cultural and physical environment (Nagi, 1976). Functional disability refers to limitations in performing independent living tasks, which are often further divided into ADLs and IADLs (Katz, Ford, Moskowitz, Jackson, & Jaffe, 1963;

Lawton & Brody, 1969). Physical function is assessed in terms of activities of daily living (ADLs) and instrumental activities of daily living (IADLs). Activities of daily living are activities that represent one's ability to manage bodily care, and include eating, dressing, bathing, toileting, transferring (from standing to a bed or a chair, etc.), grooming, and bladder and bowel control. Instrumental activities of daily living reflect one's ability to maintain a safe and clean household including meal preparation, shopping, taking medications, managing money, telephoning, heavy chores, light housework, transportation, and laundry (AoA, 2004).

More than half of the older adult population (54.5%) report having at least one physical or mental disability. Over 27.3% of community-resident Medicare beneficiaries over age 65 in 1999 had difficulty in performing one or more ADLs and 13% reported difficulties with IADLs. By contrast, 93.3% of institutionalized Medicare beneficiaries had difficulties with one or more ADLs and 76.3% of them had difficulties with three or more ADLs (AoA, 2004). Limitations on activities because of chronic conditions increase with age. Among those 65-74 years old, 19.9% had difficulties with ADLs. In contrast, 52.2% of those 85 years and older had difficulties with ADLs (AoA, 2004). Most older adults had at least one and many have multiple chronic conditions. The most prevalent chronic conditions affecting persons aged 65 years and older in 2000 – 2001 were: hypertension (49%), arthritic symptoms (36.1%), and all types of heart disease (31.1%), any cancer (20.0%), sinusitis (15.1%), and diabetes (15.0%) (AoA, 2004). Since the majority of these conditions are related to lifestyle, health programs are needed that can be accessed and utilized safely and effectively to reduce the negative impact of chronic disabling conditions.

SELF-EFFICACY

As individuals age, the accompanying deterioration in function and the restriction in performance of ADLs and IADLs serve to reduce older adults' sense of control (Mazzeo, Cavanagh, Evans, Fiatarone, Hagberg, & McAuley, 1999). In the physical activity and aging literature, this sense of control is related to self-efficacy beliefs. Self-efficacy refers to an individual's perception of capabilities within a particular domain of activities (Bandura, 1982). As defined by Bandura (1982), individuals are not merely confident or not, but rather have a degree of efficacy or confidence within a specific activity. Self-efficacy is influenced by the presence of relevant skills in the activity area, by past experience, by observing the experience of others, and by social persuasion (Bandura, Adams, & Beyer, 1977; Kazdin, 1979; Strecher, McEnvoy, Vellas, Becker, & Rosenstock, 1986).

Measurement of self-efficacy is accomplished using a continuous scale, thus increasing the conceptualization of fear from a dichotomous entity (i.e., either one is fearful or one is not) to one that is continuous (i.e. how much confidence does one have in one's ability to avoid a fall during specific activities). Self-confidence is strongly linked to functional decline since persons with low perceived efficacy or confidence in performing certain activities tend to avoid them (Bandura, 1982).

Cross-sectional data from a community-based study of older adults, aged 71 years and over, have shown that self-efficacy beliefs regarding the ability to perform ADLs without falling are associated with higher self-reported levels of physical and social functioning (Tinetti, Mendes de Leon, Doucette, & Baker, 1994). Researchers also report that higher self-efficacy beliefs are related to higher self-reported levels of physical

functioning (Mendes de Leon, Seeman, Baker, Richardson, & Tinetti, 1996). From a health perspective, efficacy has been consistently identified as a determinant of fall reduction and functional decline in older adults (Mazzeo et al., 1999).

Older people who use a walking aid, have been described as being more fearful (Howland, Peterson, Levin, Fried, Pordon, & Bak, 1998; Lachman, Howland, Tennstedt, Jette, Assmann, & Peterson, 1998). One study shows that the likelihood of being afraid of falling was increased about fourfold in individuals using an assistive device (Kressig, Wolf, Sattin, O'Grady, Greenspan, Curns, & Kutner, 2001). Researchers have found a significant association between functional performance and fear of falling (Arfken, Lach, Birge, & Miller, 1994; Lawrence, Tennstedt, & Kasten, 1998).

Fall-related self-efficacy is associated with an older adult's confidence in performing a series of everyday tasks without falling (Tinetti et al., 1990). Low scores on a Falls Efficacy Scale (FES) are associated with poor physical and social function, as well as, decline in performing ADLs without assistance, deteriorating quality of life, and increased risk of future falls (Cumming, Salkeld, Thomas, & Szonyi, 2000; Tinetti et al., 1994). In pilot studies of the FES, researchers were able to determine that risk factors for low efficacy are also risk factors for falls (Tinetti et al., 1990).

Myers and colleagues investigated the association between balance confidence and balance performance in elderly people (Myers, Powell, & Maki, 1996). They reported a strong relationship between balance confidence and performance on mediolateral sway. Participants with higher balance confidence demonstrated less postural sway in standing than participants with lower balance confidence. Koch (2002)

noted that balance confidence predicted 51% of variance in overall mental health and 32% of variance in overall physical health in community-dwelling older adults.

FEAR OF FALLING (FOF)

Fear of falling represents a common, and potentially modifiable, cause of physical dependence and functional decline among older adults (Tinetti & Powell, 1993). The fear of falling and poor functional performance are also risk factors for falls in older individuals (Tinetti et al., 1988; Tinetti et al., 1994; Tinetti et al., 1995). Fear of falling is common in older adults and limits physical activity, reduces functional abilities, and decreases quality of life (Arfken et al., 1994; Franzoni, Rozzini, & Boffeli, 1994; Lawrence et al., 1998; Tinetti et al., 1994; Vellas, Wayne, Romero, Baumgartner, & Garry, 1997). For older adults living in the community, the reported prevalence of fear of falling ranged between 29% and 77%, tending to be greater in women than men and increasing with age (Arfken et al., 1994; Lawrence et al., 1998; Tinetti et al., 1994; Vellas et al., 1997).

Fear of falling is defined as a lasting concern about falling that leads an individual to avoid activities that he/she remains capable of performing (Tinetti et al., 1993). While differentiating between appropriate and inappropriate avoidance of unsafe activities, elderly persons often report the onset of anxiety or a self-imposed decline in activity which is not justified (Tinetti et al., 1993). Tinetti et al. (1988) found that 48% of persons over the age of 75 years who had fallen in the previous year acknowledged a fear of falling compared to 27% in those who had not fallen. Most relevant is the frequency with which persons afraid of falling avoid activities because of their fear. Tinetti et al.

(1988) also found that 26% of people who fell acknowledged avoiding activities, while only 13% of people who did not fall reported restricted activity.

The fear of falling often causes individuals to avoid walking, thereby weakening their muscles and minimizing the use of physiological balance systems. Impaired mobility provokes a FOF, which may lead to older adults losing their efficacy in ambulation, refusing to walk, and consequently, becoming more immobile (Spirduso, 1995). Reduced physical activity by older adults can lead to a declining cycle of physical and mental health eventually resulting in a more dependent lifestyle.

Therefore, people who are afraid of falling tend to have a history of falling, do poorly on tests of gait and balance, have poor vision, need assistance with ADLs and rate their health as poor (Arfken et al., 1994; Howland et al., 1998; Maki, 1991). Increased FOF is also associated with a decreased quality of life in older adults (Cumming et al., 2000). This decreased quality of life is associated with a decrease in social interaction, fewer social contacts with friends and may result in depression and anxiety (Lachman et al., 1998).

Research about older persons living in the community has shown that depression correlates with fear of falling (Arfken et al., 1994; Tinetti et al., 1995; Vellas, Cayla, Bocquet, dePemille, & Albarede, 1987). Investigators found that a depressed mood is significantly associated with fear of falling in older adults (Kressig et al., 2001). Depressive symptoms, found in 25% of study participants, might be a contributing factor to fear of falling in older individuals transitioning to frailty or might be the result of activity restriction, social withdrawal, and loss of independence that often occur as a

consequence of fear of falling (Arfken et al., 1994; Tinetti et al., 1995; Vellas et al., 1987).

Neither falling nor FOF should be considered inevitable outcomes of the aging process. Given the benefits of balance training and of possessing a high fall-related self-efficacy level, it should be clear that these two characteristics would provide a greater foundation for reversing dependency and improving quality of life in older adults. Balance training provides improved postural stability, balance, and strength. A high fall-related self-efficacy level increases an older adult's sense of control over ADLs and IADLs and enables the individual to participate in more activities.

Since this study evaluates a four-week foam-support balance training program to improve fall-related self-efficacy in older adults, several areas of the research literature have been reviewed. These include related areas concerning tools, techniques, and instruments for assessment of fall-related self-efficacy, fall-related physical performance measures, and a review of balance training programs.

ASSESSING FALL-RELATED SELF-EFFICACY

There are many means of performing assessments for fall-related self-efficacy. Typically, these assessments are made via questionnaires of the participant or their caregiver and family members, or by observation. Questionnaires available include those measuring ADLs and IADLs, fall-related self-efficacy, and functional independence.

Gerontologists and other health practitioners and researchers have access to a wide range of validated and reliable surveys and questionnaires for assessing fall-related self-efficacy in older adults. Among the more popular surveys and questionnaires are the

"Falls Efficacy Scale" (FES) (Tinetti et al., 1990), "Activities-Specific Balance Confidence Scale" (ABC) (Powell & Myers, 1995), "Survey of Activities and Fear of Falling in the Elderly" (SAFE) (Lachman et al., 1998), and "Perceived Ability to Manage Falls and Falling and Perceived Control Over Falling" (Lawrence et al., 1998). The researcher in the current study chose to use the FES, which assesses the perceived self-efficacy levels at avoiding falls during various ADLs and IADLs.

The FES was selected because of its short length for administration, ease of administration and computation of results, and reliability and validity (Cumming et al., 2000). This research tool has been used effectively in clinical practice and is considered to be appropriate for community-dwelling older adults and patients with stroke (Hellstrom & Lindmark, 1999; Tinetti et al., 1990). The FES has been modified, expanded, and used in conjunction with the "Balance Self-Perceptions" test (Hill, Schwarz, Kalogeropoulos, & Gibson, 1996; Shumway-Cook, Gruber, Baldwin, & Liao, 1997; Tennstedt, Howland, Lachman, Peterson, Karsten, & Jette, 1998).

The FES is based on the operational definition of fear as "low perceived self-confidence at avoiding falls during essential, relatively non-hazardous activities." A modified FES version used in the Frailty and Injuries Cooperative Studies of Intervention Techniques (FICSIT) trials was used by the researcher (Berkmann, Berkmann, & Kasl, 1986). It consists of a ten item questionnaire, either self-administered or administered through interview. Respondents rate their level of confidence in performing common activities such as "taking a shower or bath" and "reaching into cabinets" without falling. Each item is rated on a 4-point scale, with "1" indicating "not at all concerned" and "4" indicating "very concerned" (Kressig et al., 2001). The FES has good internal

consistency (=.91), test-retest reliability (r = .71), and construct validity (=.70) (Cumming et al., 2000). The FES score is significantly associated with difficulty getting up after a fall, anxiety trait, general fear score, and several measures of balance and gait (Tinetti et al., 1990).

FALL-RELATED PHYSICAL PERFORMANCE MEASURES

Fall-related physical performance measures provide a standardized means to measure fall-related physical performance impairments and physical function in older adults (Rogers, Rogers, Takeshima, & Islam, 2003). Performance measures are more reliable than self-reports and can help contravene memory errors from aging, reduce the effect of cognition and hearing impairment on a person's ability to perceive or answer a questionnaire, and show excellent reliability and validity in predicting physical function and falls (Guralnik, Branch, & Cummings, 1989). Several performance measures assess lower extremity function, which is a major component associated with fall risk in older adults (Rogers et al., 2003). Measures for lower extremity performance include static balance, dynamic balance, walking velocity and mobility, and muscle strength. These measures are predictive of falls in older adults and are necessary for mobility and function (Tinetti et al., 1988).

Typically, more complex balance and mobility analysis is performed in laboratories, by measuring the biomechanical components of locomotion, including joint angles, stride length, and step frequency. However, several brief, reliable, and valid field tests are used to provide an effective means of measuring mobility and balance (Rogers et al., 2003). These lower extremity performance measures include the "functional reach",

"single-leg stand", "semi-tandem stand", "tandem stand", "single-leg stand with eyes closed", "Eight-foot up-and-go", and "30-second chair stand" (Rogers et al., 2003). The researcher in the current study chose to measure dynamic balance using the functional reach and eight-foot up-and-go tests and static balance using the single-leg stand and tandem stand tests. These tests were selected because they can be readily assessed outside of a balance laboratory and have been widely used to quantify balance in the elderly.

STATIC BALANCE ACTIVITIES

SINGLE-LEG STAND

Static balance is measured by a single-leg balance test. The participant stands on the preferred foot while resting the hands at waist level and then raises the other foot approximately ten centimeters off the floor. Balance is scored by the number of seconds the foot is kept raised or until balance is lost. Timing is terminated when the participant touches the raised foot to the floor, removes their hands from the hips, moves the supporting foot from the original starting position, or hooks the raised leg behind the support leg (Rogers at al., 2003). The single-leg balance measure has a test-retest reliability of .96 (Franchignoni, Martino, Ricupero, & Tesio, 1998).

TANDEM STAND

The tandem stand is measured by having the participant stand with the heel of one foot directly in front of and touching the toes of the other foot. Balance is scored as the number of seconds the participant can remain in that position or until balance is lost.

Timing is terminated when the participant moves from the tandem position or put the other foot down, moved the foot on the floor, or touched any object with his/her hand to maintain balance was used for the measurement end point (Rogers et al., 2003). The tandem stand has a test-retest reliability of .95 (Franchignoni et al., 1998).

DYNAMIC BALANCE ACTIVITIES

FUNCTIONAL REACH

Functional reach is a measure of dynamic balance and has been used as a predictor of falls in older adults. It is a measure of the maximal distance an individual can reach forward beyond an arm's length while maintaining a fixed base of support in a balanced and standing position. The functional reach is measured in inches, as the difference in reach from the starting to final position (Duncan, Studenski, Chandler, & Prescott, 1992). Researchers showed that if participants were unable to reach, the adjusted odds ratio (OR) was 8.07; if the participant's reach was less than or equal to six inches, the OR was 4.02; and if the reach was greater than six inches but less than ten inches, the OR was 2.00 (Duncan et al., 1992). The functional reach measure has a test-retest reliability of .89 (Sherrington & Lord, 2005).

EIGHT-FOOT UP-AND-GO

Eight-foot up-and-go test is a measure of walking speed, agility, and dynamic balance (Rikli & Jones, 1999). An eight-foot course is set up with a chair at one end and a cone at the other. The individual gets up from the chair, walks toward and around the cone, returns to the chair and sits. This is timed and recorded in seconds. The actual

score is recorded as the best of three trials (Rikli & Jones, 1999). The eight-foot up-and-go test has an inter-tester and intra-tester reliability of .95 (Steffen, Hacker, Mollinger, 2002). Researchers noted that older adults who required 6.9 seconds or longer to complete this test were classified as fallers with an 82% prediction rate (Rose, Jones, & Lucchese, 2002).

BALANCE TRAINING PROGRAMS

Participation in a regular physical activity program contributes to the prevention of falling in older adults by strengthening lower limb and back muscles, enhancing postural reactions, and by improving gait, flexibility, mobility, and self-confidence in physical abilities (Spirduso, 1995). Many balance training exercises that target the muscular and sensory systems of older adults improve postural stability, strength, reaction time, body sway on firm and soft surfaces, and reduce fall frequency (Mazzeo et al., 1999). Physical activity programs, (including aerobics, strength training, flexibility, and balance exercises) also improve health, functional capacity, quality of life, and independence for older adults (Mazzeo et al., 1999).

Loss of balance increases the risk of falls, affecting the ability of older adults to perform ADLs and IADLs, limiting an independent quality of life. Hu and Woollacott (1994) studied the effects of ten, one hour multi-sensory balance training sessions in older adults between the ages of 65 and 90 years. The study's balance activities involved an individual standing on both a firm (hard) and a foam (soft) support surface, with eyes open or closed and head in neutral or extended position. Participants in the training group made significant improvements in postural sway while standing on both the foam

and firm support, with eyes closed and/or head extended compared to the control group (Hu & Woollacott, 1994). In another study, researchers examined the effects of a nine-week multi-sensory balance training program. Training activities included balance tasks, dance steps, and ball exercises in adults of ages 70 to 75 years. Participants also made significant improvements in single-leg stand with eyes closed, single-leg stand with head rotation, and the thirty meter walk compared to the control group (Kronhed, Moller, Olsson, & Moller, 2001).

In a ten-week balance training program using Thera-Band exercise balls, in older adults 61 to 77 years of age, investigators found a significant reduction in postural sway when participants stood with their feet apart and in the semi-tandem position with eyes open and closed. Dynamic balance, measured using functional reach, also improved by 20% (Rogers, Fernandez, & Bohlken, 2001). Significant improvements were observed for the "Limits of Stability" test in the directions most closely associated with falls that result in hip fracture, the right, left, and back directions (Greenspan, Myers, Kiel, Parker, Hayes, & Resnick, 1988). In the right/back direction, end-point excursion improved by 67% and maximum end-point excursion improved by 27%. End-point excursion improved by 66% and maximum end-point excursion improved by 23% in the left/back direction. In the back direction, end-point excursion improved by 77% and maximum end-point excursion improved by 63%. No changes were observed in any of the balance variables for the control group.

Combined programs, especially those emphasizing multi-sensory training and balance specific activities may be more effective in improving balance than general exercise programs or those consisting of only aerobic, strength, or flexibility exercises. Researchers found a significant training effect among older adults using a global general exercise program which emphasized the vestibular system. Participants practiced standing on one leg while shaking their heads or closing their eyes, jogging, various trampoline exercises, and turning while walking (Ledin, Kronhed, Moller, Moller, Odkvist, & Olsson, 1991). In another study, researchers used an eight-week training protocol of leg muscle strengthening exercises with progressively increased external loads among older adults who were 90 years of age. They reported significant improvements in strength and mass of the leg muscles and increased tandem gait speed and reduction in the use of assistive devices (Fiatarone, Marks, Ryan, Meredith, Lipsitz, & Evans, 1990).

CONCLUSION

Although older adult assisted-living residents are at a great risk for falling and deterioration of physical and functional abilities, this population has not been studied extensively to test the impact of balance training on fear of falling. Most of these studies have focused on "community-dwelling", essentially independently-living older adults. In addition, the combination of a foam-balance training program and assessment of fear of falling in assisted-living older adult populations has not been reported in the literature.

Neither falling nor fear of falling should be considered inevitable outcomes of aging. It is the intent of this study to investigate the potential impact of a four-week foam support balance training intervention program to improve balance and fall-related self-efficacy. A physically and mentally active lifestyle will help to control an individual's fear of falling, reduce the frequency of falls, and have implications for reversing functional decline. Health professionals must routinely offer balance training and other physical activity programs at assisted-living communities to help sustain the functional status needed for independent living during old age.

APPENDIX B

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APPENDIX C

INSTITUTIONAL REVIEW BOARD MATERIAL

THE UNIVERSITY of TENNESSEE
Institutional Review Board
Office of Research
404 Andy Holt Tower
Knoxville, Tennessee 37996-0140
(865) 974-3466
Fax: (865) 974-2805

06/02/04

IRB#: 6632B

TITLE: "Effects of Balance Training on Fall-Related Self-Efficacy in Assisted-Living Older Adults"

Hurtubise, James
Health & Exercise Science
1914 Andy Holt Ave.
Campus

Klein, Dr. Diane
Health & Exercise Science
1914 Andy Holt Ave.
Campus

The points of clarification you submitted to this office regarding the above-captioned project, satisfied the concerns of the reviewers and the IRB, thus your project is approved.

This approval is for a period ending one year from the date of this letter. Please make timely submission of renewal or prompt notification of project termination (see item #3 below).

Responsibilities of the investigator during the conduct of this project include the following:

1. To obtain prior approval from the Committee before instituting any changes in the project.
2. To retain signed consent forms from subjects for at least three years following completion of the project.
3. To submit a Form D to report changes in the project or to report termination at 12-month or less intervals.

The Committee wishes you every success in your research endeavor. This office will send you a renewal notice on the anniversary of your approval date.

Sincerely,

Brenda Lawson

Brenda Lawson
Compliances

FORM B

IRB # 6632-B

Date Received in OR MAY 0 5 2004 MAY 0 5 2004

THE UNIVERSITY OF TENNESSEE

Application for Review of Research Involving Human Subjects

I. IDENTIFICATION OF PROJECT

1. **Principal Investigator (PI)**
James Hurtubise, M.S.
Department of Health and Exercise Science
1914 Andy Holt Avenue
Knoxville, TN 37996-2710

Phone: (865) 974-4215
Email: jhurtubi@utk.edu

Faculty Advisor:
Dr. Diane Austrin Klein, Ph.D.
Department of Health and Exercise Science
1914 Andy Holt Avenue
Knoxville, TN 37996-2710

Phone: (865) 974-0294
Email: dklein1@utk.edu

Department:
Dept. of Health and Exercise Science
College of Education, Health and Human Sciences
Knoxville Campus

2. **Project Classification:** Dissertation

3. **Title of Project:** "Effects of Balance Training On Fall-Related Self-Efficacy In Assisted-Living Older Adults"

4. **Starting Date:** Upon IRB Approval

5. **Estimated Completion Date:** July 2004

6. **External Funding (if any):** None at this time

II. BACKGROUND

Falls are the primary cause of death for those 80 and older and the second most common cause of death resulting from unintentional injuries for those aged 55 – 79 years (National Safety Council, 2000). An estimated 45% of adults over the age of 65 years will experience at least one fall per year, with more than 210,000 hip fractures annually in the US (Gryfe, C. I., Amies, A., & Ashley, M. J., 1977; Lindsay, 1995). Further, falls cause 90% of hip fractures in the United States (US), resulting in costs of approximately 10 billion dollars (Carter, N. D., Kannus, P., & Khan, K. M., 2001). Approximately 50% of people who fall and break their hips are never functional walkers again (Spirduso, 1995).

Falls pose a concern due to the psychological and social factors associated with restricted functional mobility, physical dependence, and potential life-style changes (Woolley, S. M., Czaja, S. J., & Drury, C. G., 1997). Loss of balance increases the risk of falls, affecting the ability of older adults to perform activities of daily living (ADLs) and instrumental activities of daily living (IADLs), limiting an independent quality of life. Additionally, fall-related injuries and their consequences are associated with declining function in activities of daily living (ADLs) (Tinnetti, M. E., Speechley, M., & Ginter, S. F., 1988) and are the leading cause of death from injuries for these individuals (Sattin, 1992).

Fear of falling (FOF) is defined as a lasting concern about falling that leads an individual to avoid activities that he/she remains capable of performing (Tinnetti, M. E., & Powell, L., 1993). The fear of falling decreases physical function and social interaction for older adults. Older adults, who have a low fall-related self-efficacy, experience a decline in unassisted activities of daily living, have a deteriorating perception of the quality of their life, and are at an increased risk of future falls (Cumming, R. G., Salkeld, G., Thomas, M., & Szonyi, G., 2000; Tinnetti, M. E., Mendes de Leon, C. F., Doucette, J. T., & Baker, D. I., 1994). For older adults living in the community, the reported prevalence of fear of falling ranged between 29% and 77%, tending to be greater in women than men and increasing with age (Arfken et al., 1994; Lawrence et al., 1998; Tinetti et al., 1994; Vellas et al., 1997;). Tinetti et al. (1988) found that 48% of persons over the age of 75 years who had fallen in the previous year acknowledged a fear of falling; as compared to 27% of whom had not fallen. Most relevant is the frequency with which persons afraid of falling avoid activities because of their fear. Tinetti et al. (1988) also found that 26% of people who fell acknowledged avoiding activities, while only 13% of people who did not fall reported restricted activity.

Fall-related self-efficacy relates to an older adult's confidence in performing a series of everyday tasks without falling (Tinnetti et al., 1990). Myers and colleagues investigated the association between balance confidence and balance performance in elderly people (Myers, A. M., Powell, L. E., & Maki, B. E., 1996). They reported a strong relationship between balance confidence and performance on mediolateral sway, with subjects with higher balance confidence demonstrating less postural sway in standing than subjects with lower balance confidence. Koch (2002) noted that balance confidence predicted 51% of variance in overall mental health and 32% of variance in overall physical health in community-dwelling elderly people.

Participation in a regular physical activity program contributes to the prevention of falling in older adults by strengthening lower limb and back muscles, enhancing postural reactions, and by improving gait, flexibility, mobility, and self-confidence in physical abilities (Spirduso, 1985). Many balance training exercises that target the muscular and sensory systems of older adults improve postural stability, strength, reaction time, body sway on firm and soft surfaces, and reduce fall frequency (Mazzeo et al., 1999). Hu and Woollacott (1994) studied the effects of ten, 1-hour multisensory

balance training sessions in older adults between the ages of 65 and 90 years. The study's balance activities involved an individual standing on both a firm (hard) and a foam (soft) support surface, with eyes open or closed and head in neutral or extended position. Subjects in the training group made significant improvements in postural sway while standing on both the foam and firm support, with eyes closed and/or head extended compared to the control group (Hu & Woollacott, 1994).

Research is available concerning the role of fall-related self-efficacy and balance training, and the FES for the older adult population. Most of these studies have focused on "community dwelling", essentially independent living older adults. Few, if any studies have focused on fall prevention/intervention programs specifically designed to reverse dependency for the assisted-living older adult. Neither falling nor fear of falling should be considered inevitable accompaniments of aging. Rather, with certain risk factors which may be amended through intervention. Fear of falling, therefore, represents a common, and potentially modifiable, cause of physical dependence and functional decline among older adults (Tinnetti et al., 1993).

III. PROJECT OBJECTIVES

The proposed project is a balance training program using a foam (soft) surface for training assisted-living older adults in order to:

1. improve static and dynamic balance
2. enhance fall-related self-efficacy

IV. DESCRIPTION AND SOURCE OF RESEARCH PARTICIPANTS

Residents of two assisted-living facilities will be invited to participate during a recruiting program conducted by the facilities' management organizations. **Participation will be approved either by the resident or a legal guardian (one who has power of attorney). Family physician's will also approve their participation.** The facility management will actually handle identification of prospective participants and their recruitment with no coercion, using the principal investigators' consent form (see 'Informed Consent Form") and medical authorization form (see "Participant Medical Form") located in the attachments.

The first facility involved in this research is Manorhouse Assisted-Living, located at 8501 South Northshore Drive, Knoxville, TN 37922. The Director of Activities, Leann Drinnen, will be recruiting older adults between and including 65 - 75 years of age, with some functional dependence, but able to meet the eligibility criteria (see "Methods and Procedures" in the next section). This facility was selected to serve as the control group, since it had been used for previous research projects with Dr. Diane Klein, and had agreed to participate. **Participants in this facility will perform all initial and final assessments, yet not be included in the four-week training period. During the four-week training period, the participants will resume their normal activity level, while continuing to allow the body's normal aging process to occur.**

The second facility involved in this research is NHC Place Assisted Living, located at 122 Cavett Hill Lane, Knoxville, TN 37922. The Director of Marketing, Vivian Akins, will be recruiting older adults between and including 65 - 75 years of age, with some functional dependence, but able to meet the eligibility criteria (see "Methods and Procedures" in the next section). This facility was selected to serve as the training/intervention group, since it had not been used as a research facility for previous projects, and had agreed to participate. **Participants in this facility will perform all initial and final**

assessments and be included in the four-week training period (see "Methods and Procedures" in the next section).

V. METHODS AND PROCEDURES

This study is a six-week project with a one-week pre-training period followed by a four-week training period and a one-week post-training period. Participants in the study will include a group of 20-30 assisted-living older adults who volunteer to participate and meet the eligibility criteria. The following criteria exclude those individuals from participating in the study: **(1) are less than 65 years of age**; (2) are neurologically or cognitively impaired; (3) have a resting blood pressure in excess of 160/90 mmHg; (4) have limiting cardiorespiratory conditions or recent joint replacement surgery (within the past twelve months); (5) have a physician's judgment against participation; (6) have pre-existing inner ear/vestibular impairments; (7) have orthostatic hypotension; and (8) unable to rise out of a chair without assistance. Facility personnel (Director of Activities, Nursing Services and Social Work) and family physicians will help determine whether each prospective participant meets the above eligibility criteria. Without the physician authorization, an individual will be excluded from the study. As long as the participant is not excluded from the study, based on the above criteria, all levels of functional capacity will be allowed to participate (see "Participant Medical Form").

Assessments include a Falls Efficacy Scale (oral questionnaire) and four direct measurements of static and dynamic balance (see attached forms). Static Balance is measured by the single-leg stand and the tandem-leg stand. Dynamic balance is tested using the functional reach and "get-up-and-go". Results will be recorded on the "Individual Data Sheet" (see attached forms) during private assessment sessions. All assessments are scheduled as individual appointments to insure confidentiality.

All assessments take 45 minutes to one hour per participant. The principal investigator, along with a student assistant and/or the Director of Activities, will handle the assessments. The PI will work with the participant to demonstrate and score the tests. The student assistant and/or Director of Activities will be the "safety" person, to insure that the participant does not fall or get injured during testing. Explanations of the physical performance tests (single-leg stand, tandem-leg stand, functional reach, and get up and go) are attached.

The pre-training week involves the initial assessment of the field tests and the Falls Efficacy Scale for the participants in both facilities. All pre-training assessments take 45 minutes to one hour per participant. The principal investigator, along with a student assistant and/or Director of Activities, will handle the assessments. The PI will work with the participant to demonstrate and score the tests. The student assistant and/or Director of Activities will be the "safety" person, to insure that the participant does not fall or get injured during testing.

The four-week intervention involves a low-level, non-invasive one-on-one balance-training program, using a 2 ½ inch thick foam pad. It consists of a short warm-up, six to eight balance exercises and a short cool-down. Each training session will take 15 to 30 minutes with each participant and be performed two times a week. All exercises are performed with the participant standing on the foam pad and with the PI and/or student assistant/Director of Activities standing near the participant to insure safety during the exercise training sessions. All training involves one-on-one trainers (trained by the PI) to insure standardized training and to minimize potential for injury. Each participant will be trained in their own home environment so that they may develop the habit of exercising for balance improvement and continue to do so routinely, and to insure confidentiality. During the training

program, participants will be encouraged to maintain their regular routine plus the training exercises at the scheduled times. Training is twice weekly and is recommended for maintenance of balance.

The post-training week involves the final assessment of the field tests and the Falls Efficacy Scale for the participants in both facilities. All post-training assessments take 45 minutes to one hour per participant. The principal investigator, along with a student assistant and/or Director of Activities, will handle the assessments. The PI will work with the participant to demonstrate and score the tests. The student assistant and/or Director of Activities will be the "safety" person, to insure that the participant does not fall or get injured during testing.

VI. SPECIFIC RISKS AND PROTECTION MEASURES

As with any exercise program there is always the risk of falls and/or injury, however, there is no more risk than that of an individual's daily routine with this exercise program. The use of two-on-one training minimizes risk of falls and/or injury when trainer is present as well as continued reminders to participants not to push themselves too hard or too fast. Two researchers at every assessment-one for data collection (the PI) and one for participant safety (student assistant or the Director of Activities). This will help to build confidence and a sense of security within each participant to know that they will not fall. Throughout the study, the participant is required to place their hands on a chair, which is supported against the wall, to enhance balance confidence. The foam mat is also taped to the floor to prevent the mat from sliding. The PI will handle all measurements, interviews, and recording of data and the student assistant and/or Director of Activities will be on hand during all standing assessments to catch the individual in order to minimize the potential for falls during assessment. The facility will be a partner in this intervention and a letter of cooperation and support is attached.

VII. BENEFITS

Benefits from the study may include improvements in participant: (1) gait, balance, and mobility and (2) feelings of self-efficacy. Participants will also contribute to the overall health and well-being of other older adults in assisted-living populations when the results of the study are disseminated in conferences, seminars, classes, and publications.

VIII. METHODS FOR OBTAINING "INFORMED CONSENT" FROM PARTICIPANTS

The Director of Activities at each facility, along with the health personnel, will identify and recruit prospective participants with the PI attending recruitment activities. During these recruitment events, the PI will discuss the purpose and procedures for the study. At the recruitment event, the PI and the Director of Activities will provide a set of forms - cover letter, informed consent, physician's cover note and participant medical form - to each prospective participant. The consent form must be signed by the participant and countersigned by whoever holds physical "power of attorney" for the participant, and returned along with the participant medical form (filled out and signed by the participants family physician). Return of the consent and medical forms will be coordinated with the Facility Director and/or Director of Activities. (see attached set of consent and medical forms plus cover letters)

IX. QUALIFICATIONS OF THE INVESTIGATOR(S) TO CONDUCT RESEARCH

The principal investigator is a Graduate Teaching Associate in the Department of Health and Exercise Science in the College of Education, Health, and Human Sciences. In addition, the PI is pursuing a doctoral degree in Human Ecology, specializing in Community Health and Gerontology. For the past ten years, he has been employed in the field of strength and conditioning, attaining many related human performance certifications, as well as, an M.S. in Sports Administration from the University of Tennessee, Knoxville (UTK). The PI designed, coordinated, and implemented his master's study at UTK. The PI has been influenced in the field of gerontology by his faculty mentor, Dr. Diane Klein.

Recently, the principal investigator served as a Research Assistant for Dr. Diane Klein in the Department of Health and Exercise Science in the College of Education, Health, and Human Science. He assisted with the assessment activities and a portion of the training activities for her research project titled, "Reversing Declining Functional Status in Assisted-Living Older Adults". Dr. Klein has extensive experience with this population group, as well as, extensive knowledge of balance training techniques.

Both the Manorhouse Assisted-Living and NHC Place Assisted-Living facilities have an Activity Director with Exercise credentials/certificates. In addition, interns on the project will likely include undergraduate students in health promotion, exercise science, and/or nursing students with a certificate or minor program in gerontology. They will be trained to: (1) interact appropriately with the participants; and (2) handle the intervention activities. In addition, each intern will be required to complete and sign a confidentiality agreement (see appendix) to ensure that confidentiality is maintained throughout the study and after its completion.

X. FACILITIES AND EQUIPMENT TO BE USED IN THE RESEARCH

The principal investigator will be using an Airex Foam Pad (six feet in length; 2 ½ inches thick; and three feet wide) to conduct all balance training exercises. Each balance training session will be held onsite, in the activity room of each facility.

Tennessee, Knoxville (UTK). The PI designed, coordinated, and implemented his master's study at UTK. The PI has been influenced in the field of gerontology by his faculty mentor, Dr. Diane Klein.

Recently, the principal investigator served as a Research Assistant for Dr. Diane Klein in the Department of Health and Exercise Science in the College of Education, Health, and Human Science. He assisted with the assessment activities and a portion of the training activities for her research project titled, "Reversing Declining Functional Status in Assisted-Living Older Adults". Dr. Klein has extensive experience with this population group, as well as, extensive knowledge of balance training techniques.

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XI. RESPONSIBILITY OF THE PRINCIPAL/CO-PRINCIPAL INVESTIGATOR(S)

By compliance with the policies established by the Institutional Review Board of The University of Tennessee the principal investigator(s) subscribe to the principles stated in "The Belmont Report" and standards of professional ethics in all research, development, and related activities involving human subjects under the auspices of The University of Tennessee. The principal investigator(s) further agree that:

1. Approval will be obtained from the Institutional Review Board prior to instituting any change in this research project.

2. Development of any unexpected risks will be immediately reported to Research Compliance Services.

3. An annual review and progress report (Form R) will be completed and submitted when requested by the Institutional Review Board.

4. Signed informed consent documents will be kept for the duration of the project and for at least three years thereafter at a location approved by the Institutional Review Board.

XII. SIGNATURES

Principal Investigator James Hurtubise, M.S.

Signature [signature] Date 5/4/4

Faculty Advisor Dr. Diane Austrin Klein, Ph.D.

Signature Diane A. Klein Date 5/4/04

XIII. DEPARTMENT REVIEW AND APPROVAL

The application described above has been reviewed by the IRB departmental review committee and has been approved. The DRC further recommends that this application be reviewed as:

[ ] Expedited Review -- Category(s): _____

OR

[X] Full IRB Review

Chair, DRC Dixie L. Thompson PhD

Signature [signature] Date 5/03/04

Department Head Thomas W. George

Signature Thomas W. George Date 5/4/04

Protocol sent to Research Compliance Services for final approval on (Date) _____

Approved:
Research Compliance Services
Office of Research
404 Andy Holt Tower

Signature IRB- Brenda Lawson Date 6/2/2004

SUPPORTING DOCUMENTATION
(IN ORDER OF APPEARANCE)

- **References**
- **Letter of Support from Manorhouse & NHC (sites for study)**
- **Cover Letter for Consent Form**
- **Consent Form**
- **Cover Letter to Physicians**
- **Participant Medical Form (for physician release for participation)**
- **Falls-Efficacy Scale**
- **Data Sheet for Recording Assessments**
- **Performance Assessment Test Descriptions**
- **Balance Exercise Set**
- **Confidentiality Form**

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8501 South Northshore Drive
Knoxville, Tennessee 37922
(865) 670-0504
(865) 670-2745 Fax
www.manorhouseretirement.com

March 9 2004

TO WH)M IT MAY CONCERN:

As an a sisted living facility, it is vital to have community involvement and a volunteer spirit. V e have been involved with the University of Tennessee College of Educati n, Health : nd Human Sciences to provide a clinical setting for students. This relations hip has bee a positive experienze and we are continually seeking new ways to enhance quality f life for our residents here at Manorhouse. We discovered that we could beco ne a part f a research projec which would give our residents a structured balance assessm nt and plan for increasing strength, balance, and mobility.

I have s oken with Dr. Diane Klein and Jim Hurtubise to discuss the possibility of be ng involve in this work. Our facility is requesting to be a partner in the research project with Dr Klein and Jim Hurtubise.

Thank) u for the opportunity participate in this research project.

Best re ards,

Leann Drinnen

Leann I rinnen
Directo of Activities

March 9, 2004

To Whom It May Concern,

NHC Place prides its self in providing a variety of interesting programs and activities for our residents. The age range for our resident is from a young sixty-three to a "young " one-hundred year old, the average age being eighty-four.

These residents are true volunteers. They are always open and willing to participate in any challenge or opportunity presented to them.

I have had several conservations with Jim Hurtubise Ph.D. Candidate at the The University of Tennessee. I feel that our residents would provide an excellent resource for Mr. Hurtubise' research study.

I am requesting that NHC Place be considered as a site for Mr. Hurtubise doctoral research project, and beginning a relationship with U.T. providing a clinical setting for future projects.

Sincerely,

Vivian Akins LPN
Admissions / Marketing Director

122 CAVETT HILL LANE
FARRAGUT, TENNESSEE 37922
PHONE: 865 • 777 • 9000

THE UNIVERSITY OF TENNESSEE

Department of Health and Exercise Science
1914 Andy Holt Avenue
Knoxville, TN 37996-2710
(865) 974-5041
FAX (865) 974-6439

June 3, 2004

Dear Prospective Participant,

This letter is written to invite you to participate in a research study designed to examine the benefits of balance training and confidence in assisted-living populations. Balance and confidence will be measured through falls confidence scales and tests of static and dynamic balance.

If you decide to participate, the study will cover a 6-week period. The attached "informed consent" form explains the study in detail. This 6-week period includes: (1) a 1-week baseline assessment and a 5-week normal aging period.

Participation in the study will remain strictly confidential. All identifying information will be locked up in a file cabinet in my office at the University of Tennessee. Data used to report the research will include only statistical information and absolutely no identification information will be used. Identification information is needed only to maintain contact with you throughout the study period. A unique record number will be used to connect information between assessment periods. Results from this research study may be published, but your name will not be used.

If you would like to participate in this study, please complete and return the two forms – Participant Medical Form and Informed Consent Form – attached to this cover letter to either Leann Drinnen or Jim Hurtubise . If you have any questions concerning the research study, please contact me at (865) 974-4215 and leave a message and I will return your call as quickly as possible. Thank you for your cooperation and participation.

Sincerely,

Jim Hurtubise, M.S.
Graduate Teaching Associate
Department of Health & Exercise Science
The University of Tennessee, Knoxville

THE UNIVERSITY OF TENNESSEE

Department of Health and Exercise Science
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June 3, 2004

Dear Prospective Participant,

This letter is written to invite you to participate in a research study designed to examine the benefits of balance training and confidence in assisted-living populations. Balance and confidence will be measured through falls confidence scales and tests of static and dynamic balance.

If you decide to participate, the study will cover a 6-week period. The attached "informed consent" form explains the study in detail. This 6-week period includes: (1) a 1-week pre-training period; (2) a 4-week balance training period; and (3) a 1-week post-training period.

Participation in the study will remain strictly confidential. All identifying information will be locked up in a file cabinet in my office at the University of Tennessee. Data used to report the research will include only statistical information and absolutely no identification information will be used. Identification information is needed only to maintain contact with you throughout the study period. A unique record number will be used to connect information between assessment periods. Results from this research study may be published, but your name will not be used.

If you would like to participate in this study, please complete and return the two forms – Participant Medical Form and Informed Consent Form – attached to this cover letter to either Vivian Akins or Jim Hurtubise . If you have any questions concerning the research study, please contact me at (865) 974-4215 and leave a message and I will return your call as quickly as possible. Thank you for your cooperation and participation.

Sincerely,

Jim Hurtubise, M.S.
Graduate Teaching Associate
Department of Health & Exercise Science
The University of Tennessee, Knoxville

EFFECTS OF BALANCE TRAINING ON FALL-RELATED SELF-EFFICACY IN ASSISTED-LIVING OLDER ADULTS

INFORMED CONSENT FORM

INTRODUCTION

I HAVE BEEN INFORMED THAT:

- James Hurtubise, who is a graduate teaching associate in the Department of Health and Exercise Science, in the College of Education, Health, and Human Sciences, at the University of Tennessee, Knoxville, Tennessee, has requested my participation in a research study for this institution, to be located at my home site.

- The purpose of the research is to examine the effectiveness of a balance training program to improve fall-related self-confidence in assisted-living older adults. To evaluate this, the study will assess changes in balance to: 1) improve balance for activities of daily living (ADLs) and instrumental activities of daily living (IADLs); and 2) improve self-confidence.

PARTICIPANT INVOLVEMENT IN THE STUDY

- My participation will involve securing my consent for participation and approval from my doctor.

- I will participate fully in all three stages of the study – pre-training, training, and post-training. The entire study will be six-weeks long.

- As a participant, I will participate in two separate one-hour assessments: 1) before the four-week training period and; 2) at the end of the four-week training period.

- At the end of the training period, my trainer, James Hurtubise, will teach me how to perform the set of exercises without a partner so that I can continue to do them safely on my own.

- Assessments will include one balance-confidence questionnaire and four balance activities (Functional Reach, Tandem Leg Stand, Single-Leg Stand, & Get Up-and-Go). These activities involve sitting, standing on one leg, walking, and stretching.

- Training activities will also involve sitting, standing on one leg, walking, and stretching. They will be performed on a 2 ½ inch thick foam pad and conducted in my home.

- During the training stage (four weeks), I will work with my trainer two times per week for a period of up to 60 minutes per session, including blood pressure checks, warm-up, balance training, and cool-down.

 Initials: _____

RISKS

- There may be some risk for injury for me if I agree to participate in this study, but no more than I would have doing my day-to-day routine. My trainer will take care not to let me push myself too far, and I must observe the same caution when working on my own.

BENEFITS

- The possible benefits of my participation in the research are improvements in: my balance, and mobility; my feelings of well-being; and my feelings of confidence. Plus, I will have contributed to improving health and well-being for other older adults in assisted-living populations when the results of this study are shared in seminars, conferences, classes, and publications.

CONFIDENTIALITY

- The results of the research study may be published but my name and identity will not be revealed. In order to maintain confidentiality of my records, James Hurtubise will assign a unique identification number to track my records so that all identifying information can be separated from the data scores and statistics. The identifying information will be locked in a file cabinet in James Hurtubise's office (Room 378, HPER Building), accessible only to James Hurtubise. Data used to report the research will include only the scores and statistical information and absolutely no identification information will be used. All field notes taken during the visitation and/or training will also be locked in the same file cabinet.

COMPENSATION

- I will not be paid for my participation in the study.

EMERGENCY MEDICAL TREATMENT

- The University of Tennessee does not "automatically" reimburse participants for medical claims or other compensation. If physical injury is suffered in the course of research, or for more information, I will notify the investigator in charge, James Hurtubise at (865) 974-4215.

- In case of injury, I can seek the appropriate treatment or care for injuries incurred at my residence facility's health center, which will be provided at my expense.

Initials: _____

CONTACT INFORMATION

- If I have any questions at any time about the study or the procedures, or if I experience adverse effects as a result of participating in this study, I may contact the researcher, James Hurtubise at the University of Tennessee, Department of Health and Exercise Science, 1914 Andy Holt Avenue, Knoxville, TN 37996-2710, and phone number (865) 974-4215.

- If I have questions about my rights as a participant in this research, or if I feel I have been placed at risk, I can contact the Research Compliance Services of the Office of Research at the University of Tennessee at (865) 974-3466

PARTICIPATION

- My participation in this study is strictly voluntary and I may choose not to participate or if I participate, I may choose to withdraw from the study at any time without affecting my treatment or care.

CONSENT

- The nature, demands, benefits, and any risk of the project have been explained to me. I knowingly assume any risks involved. I understand that I may withdraw my consent and discontinue participation at any time without penalty or loss of benefit to myself.

- I have read the above information. In signing this consent form, I am not waiving any legal claims, rights, or remedies. A copy of this consent form will be given to me. I agree to participate in this study.

Participant's Name _____ Date: _____
(Please Print Full Name)

Participant's Signature _____ Date: _____
(Full Legal Signature)

Other Signature _____ Date: _____
(Power of Attorney Signature, if appropriate)

APPROVED
By IRB - Brenda Lawson

JUN 2 2004

Initials: _____

1. "I certify that I have explained to the above individual the nature and purpose, the potential benefits and possible risks associated with participation in this research study, have answered any questions that have been raised, and have witnessed the above signature."

2. "These elements of Informed Consent conform to the Assurance given by the University of Tennessee to the Department of Health & Human Services to protect the rights of human subjects."

3. "I have provided the subject/participant a copy of this signed consent document."

Signature of Investigator_____ Date:_____

Initials: _____

EFFECTS OF BALANCE ASSESSMENTS ON FALL-RELATED SELF-EFFICACY IN ASSISTED-LIVING OLDER ADULTS

INFORMED CONSENT FORM

INTRODUCTION

I HAVE BEEN INFORMED THAT:

- James Hurtubise, who is a graduate teaching associate in the Department of Health and Exercise Science, in the College of Education, Health, and Human Sciences, at the University of Tennessee, Knoxville, Tennessee, has requested my participation in a research study for this institution, to be located at my home site.
- The purpose of the research is to examine normal aging effect on balance by reviewing activities of daily living (ADLs) and instrumental activities of daily living (IADLs) and self-confidence.

PARTICIPANT INVOLVEMENT IN THE STUDY

- My participation will involve securing my consent for participation and approval from my doctor
- I am expected to participate fully in both assessments of the study – baseline and normal aging. The entire study will cover a six-week period.
- Assessments will include one balance confidence questionnaire and four balance activities (Functional Reach, Tandem Leg Stand, Single-Leg Stand, & Get Up-and-Go). These activities involve sitting, standing on one leg, walking, and stretching.

RISKS

- There may be some risk for injury for me if I agree to participate in this study, but no more than I would have doing my day-to-day routine. My trainer will take care not to let me push myself too far, and I must observe the same caution when working on my own.

BENEFITS

- The possible benefits of my participation in the research are: (1) contributing to improving health and well-being for other older adults in assisted-living populations when the results of this study are shared in seminars, conferences, classes, and publications and (2) an opportunity to participate in future balance training courses at my residence.

Initials:_____

CONFIDENTIALITY

- The results of the research study may be published but my name and identity will not be revealed. In order to maintain confidentiality of my records, James Hurtubise will assign a unique identification number to track my records so that all identifying information can be separated from the data scores and statistics. The identifying information will be locked in a file cabinet in James Hurtubise's office (Room 378, HPER Building), accessible only to James Hurtubise. Data used to report the research will include only the scores and statistical information and absolutely no identification information will be used. All field notes taken during the assessments will also be locked in the same file cabinet.

COMPENSATION

- I will not be paid for my participation in the study.

EMERGENCY MEDICAL TREATMENT

- The University of Tennessee does not "automatically" reimburse participants for medical claims or other compensation. If physical injury is suffered in the course of research, or for more information, I will notify the investigator in charge, James Hurtubise at (865) 974-4215.

- In case of injury, I can seek the appropriate treatment or care for injuries incurred at my residence facility's health center, which will be provided at my expense.

CONTACT INFORMATION

- If I have any questions at any time about the study or the procedures, or if I experience adverse effects as a result of participating in this study, I may contact the researcher, James Hurtubise at the University of Tennessee, Department of Health and Exercise Science, 1914 Andy Holt Avenue, Knoxville, TN 37996 2710, and phone number (865) 974-4215.

- If I have questions about my rights as a participant in this research, or if I feel I have been placed at risk, I can contact the Research Compliance Services of the Office of Research at the University of Tennessee at (865) 974-3466

PARTICIPATION

- My participation in this study is strictly voluntary and I may choose not to participate or if I participate, I may choose to withdraw from the study at any time without affecting my treatment or care.

Initials:_____

CONSENT

- The nature, demands, benefits, and any risk of the project have been explained to me. I knowingly assume any risks involved. I understand that I may withdraw my consent and discontinue participation at any time without penalty or loss of benefit to myself.

- I have read the above information. In signing this consent form, I am not waiving any legal claims, rights, or remedies. A copy of this consent form will be given to me. I agree to participate in this study.

Participant's Name _____ Date:_____
(Please Print Full Name)

Participant's Signature _____ Date:_____
(Full Legal Signature)

Other Signature _____ Date:_____
(Power of Attorney Signature, if appropriate)

1. "I certify that I have explained to the above individual the nature and purpose, the potential benefits and possible risks associated with participation in this research study, have answered any questions that have been raised, and have witnessed the above signature."

2. "These elements of Informed Consent conform to the Assurance given by the University of Tennessee to the Department of Health & Human Services to protect the rights of human subjects."

3. "I have provided the subject/participant a copy of this signed consent document."

Signature of Investigator_____ Date:_____

APPROVED
By IRB - Linda Lawson
JUN 2 2004

Initials:_____

THE UNIVERSITY OF TENNESSEE

Department of Health and Exercise Science
1914 Andy Holt Avenue
Knoxville, TN 37996-2710
(865) 974-5041
FAX (865) 974-6439

Physician Cover Letter

June 3, 2004

Dear Health Care Provider,

_____ (Insert Patient Name), your patient, seeks to participate in a balance training program expected to increase balance. The training program is 6-weeks in length, with a 1-week pre-training period, 4-week training period, and a 1-week post-training period. Assessments will include Falls-Efficacy Scale (FES), single-leg stand, tandem leg stand, functional reach, and get-up-and-go.

Balance training will include 6-8 exercises, for 1-2 sets, with 30 seconds to 1 minute rest between sets and be performed on a 2 ½ thick foam pad. Static body positions and gentle dynamic movements will be used to engage proprioceptors. To minimize injury potential, you are requested to complete the attached "participant medical form" providing cautionary information as well as confirmation or denial of your patient's capability to participate fully in this study.

The following criteria exclude those individuals from participating in the study:

- ✓ are less than 65 years of age;
- ✓ are neurologically or cognitively impaired;
- ✓ have a resting blood pressure in excess of 160/90 mmHg;
- ✓ have limiting cardiorespiratory conditions or recent joint replacement surgery (within the past twelve months);
- ✓ have a physician's judgment against participation;
- ✓ have pre-existing inner ear/vestibular impairments;
- ✓ have orthostatic hypotension; and
- ✓ unable to rise out of a chair without assistance.

Thank you for your assistance in this matter.

Jim Hurtubise, M.S.
Graduate Teaching Associate
Department of Health and Exercise Science
The University of Tennessee, Knoxville

THE UNIVERSITY OF TENNESSEE

Department of Health and Exercise Science
1914 Andy Holt Avenue
Knoxville, TN 37996-2710
(865) 974-5041
FAX (865) 974-6439

Physician Cover Letter

June 3, 2004

Dear Health Care Provider,

_____ (Insert Patient Name), your patient, seeks to participate in a balance assessment program expected to increase balance. The study is 6-weeks in length, with a baseline period, a 4-week normal aging period, and a final assessment. Assessments will include Falls-Efficacy Scale (FES), single-leg stand, tandem leg stand, functional reach, and get-up-and-go.

To minimize injury potential, you are requested to complete the attached "participant medical form" providing cautionary information as well as confirmation or denial of your patient's capability to participate fully in this study.

The following criteria exclude those individuals from participating in the study:

- ✓ are less than 65 years of age;
- ✓ are neurologically or cognitively impaired;
- ✓ have a resting blood pressure in excess of 160/90 mmHg;
- ✓ have limiting cardiorespiratory conditions or recent joint replacement surgery (within the past twelve months);
- ✓ have a physician's judgment against participation;
- ✓ have pre-existing inner ear/vestibular impairments;
- ✓ have orthostatic hypotension; and
- ✓ unable to rise out of a chair without assistance.

Thank you for your assistance in this matter.

Jim Hurtubise, M.S.
Graduate Teaching Associate
Department of Health & Exercise Science
The University of Tennessee, Knoxville

Participant Medical Form

Name_____

Address_____ Telephone_____

_____

Age_____ Height_____ Weight_____ Blood Pressure_____

Heart Rate_____ Smoking Habits_____

Medication_____

_____

Other (Describe any special medical conditions):

_____

_____

_____

Functional Capacity: (circle appropriate restriction for current capacity)

- UNRESTRICTED — No restrictions need to be place on the individual with respect to vigorousness or type of activity.
- MODERATE — Ordinary physical activity needs to be moderately restricted and sustained strenuous effort needs to be avoided.
- MILD — Activity needs to be restricted to a major degree; all vigorous activity should be avoided.
- LIMITED — Ordinary physical activity needs to be markedly restricted.

Anatomical Analysis Form

Indicate body areas in which physical activity should be minimized or eliminated:

Body Area	Minimized	Eliminated	Both Sides	Right Side	Left Side
Neck					
Shoulder Girdle					
Hands, Wrists, Fingers					
Abdomen					
Legs					
Knees					
Hips					
Feet, Ankles, Toes					
Other (specify):					

Doctor's Signature:_____

Doctor's Name:_____
(please print)

Address (please print):_____

_____

Telephone:_____

Date:_____, 20____

FALLS EFFICACY SCALE (FES)

Now I have some questions about common daily activities. For each of the following activities, please tell me how concerned you are about the possibility of falling: not at all concerned, somewhat concerned, fairly concerned, or very concerned.

Ask the following question for each of the ten daily activities and circle the corresponding number/letter associated with most appropriate response

"How concerned are you that you might fall while (ask activity below):"

	Not At All Concerned	Somewhat Concerned	Fairly Concerned	Very Concerned
FES 1. Cleaning the house	1	2	3	4
FES 2. Getting dressed or undressed	1	2	3	4
FES 3. Preparing simple meals	1	2	3	4
FES 4. Taking a bath or shower	1	2	3	4
FES 5. Simple shopping	1	2	3	4
FES 6. Getting in and out of a chair	1	2	3	4
FES 7. Going up and down stairs	1	2	3	4
FES 8. Walking around the neighborhood	1	2	3	4
FES 9. Reaching into cabinets or closets	1	2	3	4
FES 10. Going to answer the telephone before it stops ringing	1	2	3	4

Total FES Score: _____

INDIVIDUAL DATA SHEET

RECORD #: _____ TEST DATE: _____

NAME: _____ TEST SITE: _____

GENDER: M F AGE: ____ years ASSISTIVE DEVICE: _____

RECORD #: _____

TEST ITEM	TEST TRIAL #1	TEST TRIAL #2
Single-Leg Stand	(in seconds) _____ R or L	(in seconds) _____ R or L
Tandem Stand	(in seconds) _____ R or L	(in seconds) _____ R or L
Functional Reach	(in inches) _____ R or L	(in inches) _____ R or L
Get Up and Go 1= able 2= able w/difficulty 3= needs help 4= unable	(4-pt scale) _____ (in seconds) _____ R or L	(4-pt scale) _____ (in seconds) _____ R or L

FES Composite Score: _____

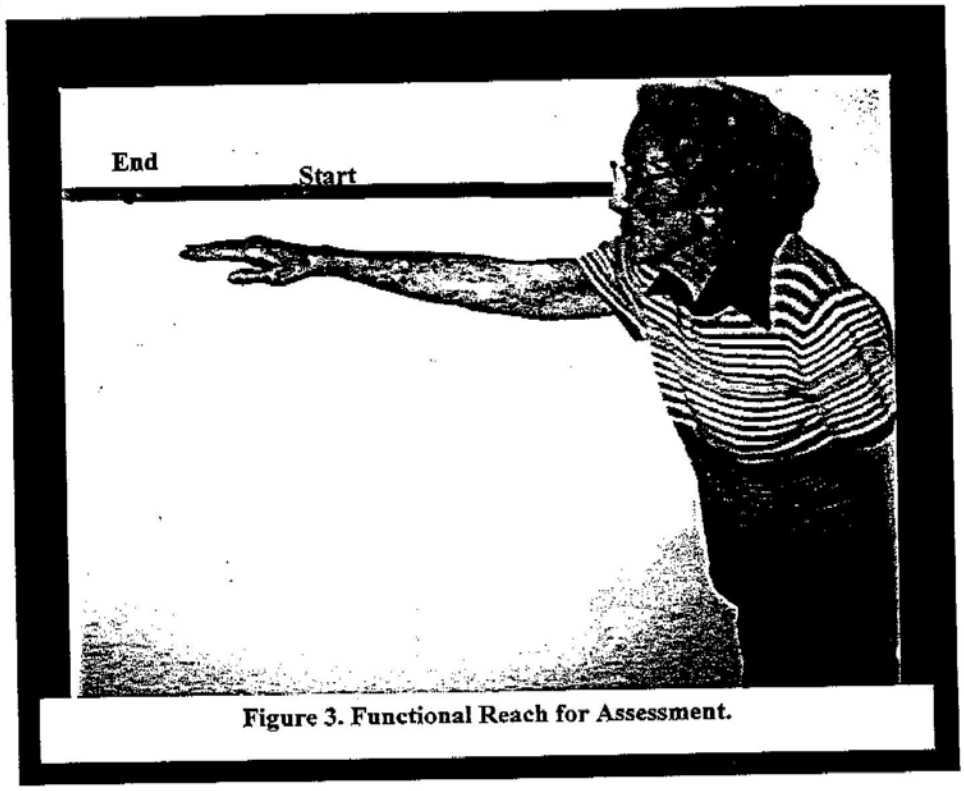

Figure 3. Functional Reach for Assessment.

Functional Reach – in a standing position, next to a wall, individual extends arm from the shoulder. Measurement at tip of fingers is marked ("Start" in picture). Individual then reaches with extended arm until balance is lost or they decide (volitional) balance will be lost. Before relaxing, measurement again marked ("End" in picture). Both the assessor and a safety person are in proximity to individual. This is a model, after the fact, demonstrating the position during the assessment.

Semi-tandem Leg Stand:

This test assesses balance. The tester demonstrates the test and then the participant takes a trial and two test runs.

The test begins with the participant in a standing position. The participant takes a tandem position (both feet in line, heel-to-toe) and then moves forward foot slightly to the side, maintaining alignment. At this point, they may be using the tester and/or "safety" person for support. On the "go" signal from the tester, the individual stands on their own, without any support until they can no longer maintain balance. As before, the safety person is behind and ready to catch and the tester is directly in front so they can support when the participant feels they can no longer continue to balance. A stopwatch is started at the "go" signal and is stopped when the participant moves feet to insure balance or uses the "safety" person, the tester, on any object for support. The best time score is recorded for evaluation of performance. All scores are recorded to nearest tenth of a second.

Tandem Leg Stand:

This test assesses balance. The tester demonstrates the test and then the participant takes a trial and two test runs.

The test begins with the participant in a standing position. The participant takes a tandem position (both feet in line, heel-to-toe, maintaining alignment. At this point, they may be using the tester and/or "safety" person for support. On the "go" signal from the tester, the individual stands on their own, without any support until they can no longer maintain balance. As before, the safety person is behind and ready to catch and the tester is directly in front so they can support when the participant feels they can no longer continue to balance. A stopwatch is started at the "go" signal and is stopped when the participant moves feet to insure balance or uses the "safety" person, the tester, on any object for support. The best time score is recorded for evaluation of performance. All scores are recorded to nearest tenth of a second.

*****NOTE: each participant performs only one of the "tandem" style stands. Which one is used often depends on their hip flexibility. Those who have had hip replacement usually opt for semi-tandem.**

Single-leg Stand:

This test assesses balance. The tester demonstrates the test and then the participant takes a trial and two test runs.

The test begins with the participant in a standing position. On the "go" signal from the tester, the individual raises one foot slightly off the ground (either up or behind) so they are standing on the preferred leg. They remain in this position, holding on to no one and nothing, but with the safety person ready to catch and the tester directly in front so they can support when the participant feels they can no longer continue to balance. A stopwatch is started at the "go" signal and is stopped when the second foot touches the floor or the participant uses the "safety" person, the tester, on any object for support. The best time score is recorded for evaluation of performance. All scores are recorded to nearest tenth of a second.

Up-and-Go:

This test assesses agility and dynamic balance. A heavy straight-back armchair is placed against a wall or secured so that it does not move during the test. It's placement is marked by masking tape on the floor. A 10-foot tape measure is used to measure 8-foot directly in front of the chair for placing a cone marker. The area should be clear of all obstructions so that a minimum of four feet of clearance around the cone is available. Participant is told that this is a "timed" test. Tester demonstrates the test.

The test begins with the participant in a fully seated position in the middle of a heavy straight-back armchair. On the "go" signal from the tester, the participant rises from the chair, using the arms of the chair or any assistive device typically used (walker, cane, etc.), and walks as quickly as possible, also using assistive devices if desired, to the cone and around it and returns to the chair and sits down. The

stopwatch is started from the "go" signal and is stopped when the participant has returned to a fully seated position. The participant has one trial and two test runs (if they are up to it). The best time score is recorded for evaluation of performance. All scores are recorded to nearest tenth of a second.

Balance Exercise Sheet

General Dynamic Warm Up (Seated in Chair)

- ✓ 3 Slow & Deep Breaths (In Nose & Out Mouth)

- ✓ Perform each activity for 10 reps.
  1. Ankle Circles
  2. Ankle Flexion & Extension
  3. March in Place
  4. Alt. Leg Extension
  5. Lower Back & Chest Stretch
  6. Arm Circles
  7. Shoulder Rolls
  8. 3 Position Neck Rotations

- ✓ 3 Slow & Deep Breaths (In Nose & Out Mouth)

Training Intervention – See Next Page

General Dynamic Cool Down (Seated in Chair)

- ✓ 3 Slow & Deep Breaths (In Nose & Out Mouth)

- ✓ Perform each activity for 5 reps.
  1. Ankle Circles
  2. Ankle Flexion & Extension
  3. March in Place
  4. Alt. Leg Extension
  5. Lower Back & Chest Stretch
  6. Arm Circles
  7. Shoulder Rolls
  8. 3 Position Neck Rotations

- ✓ 3 Slow & Deep Breaths (In Nose & Out Mouth)

Training Phase

Training Week	Exercise	Variation	Sets	Repetitions	Rest/Set
1	Plantar Flexion	Two Hands	1	10	30 sec.
	Single-Leg Stand	Two Hands	1	30 seconds	30 sec.
	Hip Flexion	Two Hands	1	30 seconds	30 sec.
	Hip Extension	Two Hands	1	30 seconds	30 sec.
	Side Leg Raise	Two Hands	1	30 seconds	30 sec.
	Walking (F)	Two Hands	1	10	30 sec.
	Walking (B)	Two Hands	1	10	30 sec.
	Shuffle	Two Hands	1	10	30 sec.
	Circle Walk	Two Hands	1	10 (5 Each Way)	30 sec.
2	Plantar Flexion	One Hand	1	10	30 sec.
	Single-Leg Stand	One Hand	1	30 seconds	30 sec.
	Hip Flexion	One Hand	1	30 seconds	30 sec.
	Hip Extension	One Hand	1	30 seconds	30 sec.
	Side Leg Raise	One Hand	1	30 seconds	30 sec.
	Walking (F)	One Hand	1	10	30 sec.
	Walking (B)	One Hand	1	10	30 sec.
	Shuffle	One Hand	1	10	30 sec.
	Circle Walk	One Hand	1	10 (5 Each Way)	30 sec.
3	Plantar Flexion	One Finger	2	10	1 minute
	Single-Leg Stand	One Finger	2	30 seconds	1 minute
	Hip Flexion	One Finger	2	30 seconds	1 minute
	Hip Extension	One Finger	2	30 seconds	1 minute
	Side Leg Raise	One Finger	2	30 seconds	1 minute
	Walking (F)	One Finger	2	10	1 minute
	Walking (B)	One Finger	2	10	1 minute
	Shuffle	One Finger	2	10	1 minute
	Circle Walk	One Finger	2	10 (5 Each Way)	1 minute
4	Plantar Flexion	No Hands	2	10	1 minute
	Single-Leg Stand	No Hands	2	30 seconds	1 minute
	Hip Flexion	No Hands	2	30 seconds	1 minute
	Hip Extension	No Hands	2	30 seconds	1 minute
	Side Leg Raise	No Hands	2	30 seconds	1 minute
	Walking (F)	No Hands	2	10	1 minute
	Walking (B)	No Hands	2	10	1 minute
	Shuffle	No Hands	2	10	1 minute
	Circle Walk	No Hands	2	10 (5 Each Way)	1 minute

THE UNIVERSITY OF TENNESSEE

Department of Health and Exercise Science
1914 Andy Holt Avenue
Knoxville, TN 37996-2710
(865) 974-5041
FAX (865) 974-6439

RESEARCH PERSONNEL CONFIDENTIALITY STATEMENT

By signing below, I acknowledge and understand that, as a member of the research team for "Effects of Balance Training On Fall-Related Self-Efficacy in Assisted-Living Older Adults" under the direction of James Hurtubise, M.S., in the Department of Health & Exercise Science, in the College of Education, Health, and Human Sciences, I am prohibited from releasing to any person (s) outside of the research team any medical and/or personal information which may come to attention during the course of my activities on this research project.

Moreover, I acknowledge and understand that any breach of confidentiality, participant or otherwise, resulting from my written or verbal release of information or records provides grounds for disciplinary action within the guidelines of the University of Tennessee IRB Review Committee and the policies of the University of Tennessee, Knoxville campus.

CONFLICT OF INTEREST POLICY ACKNOWLEDGEMENT

By signing below, I acknowledge that I have no "conflict of interest" with my activities for this research project.

Signature

Principal Investigator's Signature

Date

Date

Print Name

THE UNIVERSITY of TENNESSEE
Institutional Review Board
Office of Research
1534 White Avenue
Knoxville, Tennessee 37996-1529
Phone: (865) 974-3466
Fax: (865) 974-7400

11/29/2004

IRB#: 6632B

TITLE: "Effects of Balance Training on Fall-Related Self-Efficacy in Assisted-Living Older Adults"

Hurtubise, James
Health & Exercise Science
1914 Andy Holt Ave.
Campus

Klein, Dr. Diane
Health & Exercise Science
1914 Andy Holt Ave.
Campus

This is to inform you that your Form D request for modifications in the above protocol has been approved. This approval does not affect the original approval date.

Responsibilities of the investigator during the conduct of this project include the following:

1. To obtain prior approval from the Committee before instituting any changes in the project.
2. To retain signed consent forms from subjects for at least three years following completion of the project.
3. To submit a Form D to report changes in the project or to report termination at 12-month or less intervals.

We wish you continued success in your research endeavor.

Sincerely,

Brenda Lawson
Compliances

NOV 17 2004

FORM D

Status for Changes and/or Project Termination
Form B Approved Research Involving Human Subjects
Research Compliance Services
Office of Research
The University of Tennessee
404 Andy Holt Tower
Knoxville, TN 37996-0140

1. **IRB NO:** 6632 B
2. **Principal Investigator:** James Hurtubise, M.S.

   Department: Health & Exercise Science
3. **Mailing Address:** James Hurtubise, M.S.

   Department of Health & Exercise Science

   1914 Andy Holt Avenue

   Knoxville, TN 37996-2710
4. **Project Title:** "Effects of Balance Training On Fall-Related Self-Efficacy In Assisted-Living Older Adults"

PLEASE CHECK THE APPROPRIATE LINE(S) BELOW:

5. ____ Change of Project Title
6. ____ Change of Principal or Co-Principal Investigator(s), Other Collaborators, Student Advisor
7. ____ Change(s) to Project Which Affect Participation of Human Subjects
8. ____ Change(s) to Informed Consent Forms and/or Assent Form(s)
9. **(X) Additional Locations for Conducting Project**
10. ____ Unexpected Risks to Subjects
11. ____ Project Completed -- Please Close the IRB Files.

APPROVED By Linda Lawson

NOV 29 2004

---

12. Signatures:

Principal Investigator James Klein Date 11/8/04

Student Advisor Diane D. Klein Date 11/12/04

Departmental Review (if required) _____ Date _____

EFFECTS OF BALANCE TRAINING ON FALL-RELATED SELF-EFFICACY IN ASSISTED-LIVING OLDER ADULTS

INFORMED CONSENT FORM

INTRODUCTION

I HAVE BEEN INFORMED THAT:

- James Hurtubise, who is pursuing a Doctorate Degree in Human Ecology, in the Department of Health, Safety, and Exercise Science, in the College of Education, Health, and Human Sciences, at the University of Tennessee, Knoxville, Tennessee, has requested my participation in a research study for this institution, to be located at my home site.

- The purpose of the research is to examine normal aging effect on balance by reviewing activities of daily living (ADLs) and instrumental activities of daily living (IADLs) and self-confidence.

PARTICIPANT INVOLVEMENT IN THE STUDY

- My participation will involve securing my consent for participation and approval from my family practitioner.

- I am expected to participate fully in all three stages of the study – baseline assessment, normal aging, and follow-up assessment. The entire study will cover a six-week period.

- As a participant, I will perform two separate assessments: 1) prior to the four-week normal aging period and; 2) at the end of the four-week normal aging period.

- Assessments will include one balance confidence questionnaire and four balance activities.

RISKS

- There may be some risk for injury for me if I agree to participate in this study, but no more than I would have doing my day-to-day routine. My trainer will take care not to let me push myself too far, and I must observe caution when working on my own.

BENEFITS

- The possible benefits of my participation in the research are: (1) contributing to improving health and well-being for other older adults in assisted-living populations when the results of this study are shared in seminars, conferences, classes, and publications and (2) an opportunity to participate in future balance training courses at my residence.

 Initials:_____

CONFIDENTIALITY

- The results of the research study may be published but my name and/or identity will not be revealed. In order to maintain confidentiality of my records, James Hurtubise will assign a unique identification number to track my records so that all identifying information can be separated from the data scores and statistics. The identifying information will be locked in a file cabinet in James Hurtubise's office, (Room 378, HPER Building) accessible only to James Hurtubise. Data used to report the research will include only the scores and statistical information and absolutely no identification information will be used. All field notes taken during the visitation and/or training will also be locked in the same file cabinet.

COMPENSATION

- I will not be paid for my participation in the study.

EMERGENCY MEDICAL TREATMENT

- The University of Tennessee does not "automatically" reimburse participants for medical claims or other compensation. If physical injury is suffered in the course of research, or for more information, I will notify the investigator in charge, James Hurtubise at (865) 974-4215.

- In case of injury, I can seek the appropriate treatment or care for injuries incurred at my residence facility's health center, which will be provided at my expense.

CONTACT INFORMATION

- If I have any questions at any time about the study or the procedures, or if I experience adverse effects as a result of participating in this study, I may contact the researcher, James Hurtubise, at the University of Tennessee, Department of Health, Safety, and Exercise Science, 1914 Andy Holt Avenue, Knoxville, TN 37996-2710, and phone number (865) 974-4215.

- If I have questions about my rights as a participant in this research, or if I feel I have been placed at risk, I can contact the Research Compliance Services of the Office of Research at the University of Tennessee at (865) 974-3466

PARTICIPATION

- My participation in this study is strictly voluntary and I may choose not to participate or if I participate, I may choose to withdraw from the study at any time without affecting my treatment or care.

Initials:_____

CONSENT

- The nature, demands, benefits, and any risk of the project have been explained to me. I knowingly assume any risks involved. I understand that I may withdraw my consent and discontinue participation at any time without penalty or loss of benefit to myself.
- I have read the above information. In signing this consent form, I am not waiving any legal claims, rights, or remedies. A copy of this consent form will be given to me. I agree to participate in this study.

Participant's Name _____ Date:_____
(Please Print Full Name)

Participant's Signature _____ Date:_____
(Full Legal Signature)

Other Signature _____ Date:_____
(Power of Attorney Signature, if appropriate)

1. "I certify that I have explained to the above individual the nature and purpose, the potential benefits and possible risks associated with participation in this research study, have answered any questions that have been raised, and have witnessed the above signature."
2. "These elements of Informed Consent conform to the Assurance given by the University of Tennessee to the Department of Health & Human Services to protect the rights of human subjects."
3. "I have provided the subject/participant a copy of this signed consent document."

Signature of Investigator _____ Date:_____

APPROVED
Lourdes Lawson

NOV 2 9 2004

~~Initials:~~ omit

Outlook Pointe
AT KNOXVILLE
A BALANCED CARE ASSISTED LIVING COMMUNITY

November 4, 2004

Dr. Diane A Klein, PHD, MS, MPH
Assistant Professor
UT Gerontology and Public Health
1914 Andy Holt Avenue
Knoxville, Tennessee 37996-2710

Dear Dr. Klein:

This letter is to serve as invitation for Doctoral Graduate Student, Jim Hurtubise, to perform performance tests for a balance study. It is understood there will be IRB permission forms completed for each participant (resident) at Outlook Pointe Assisted Living who will be involved in the study. There will also be an assistant with Jim Hurtubise to assure safety for the residents while performing the tests for balance.

As always, we look forward to participating and being involved with your research study program.

Sincerely,

Diane L. Williams

Diane L. Williams
Resident Relations Director

8024 Gleason Drive • Knoxville, TN. 37919 • 423-690-3550 • Fax 423-690-7754
www.balancedcare.com

November 12, 2004

Dear Prospective Participant,

This letter is written to invite you to participate in a research study designed to examine the benefits of balance training on fall-related self-efficacy in assisted-living populations. Balance and fall-related self-efficacy will be assessed through falls efficacy scales and measurements of static and dynamic balance.

If you decide to participate, the study will cover a 6-week period. The attached "informed consent" form explains the study in detail. This 6-week period includes: (1) a 1-week pre-normal aging period; (2) a 4-week normal aging period; and (3) a 1-week post-normal aging period.

Participation in the study will remain strictly confidential. All identifying information will be locked up in a file cabinet in my office at the University of Tennessee. Data used to report the research will include only statistical information and absolutely no identification information will be used. Identification information is needed only to maintain contact with you throughout the study period. A unique record number will be used to connect information between assessment periods. Results from this research study may be published, but your name will not be used.

If you would like to participate in this study, please complete and return the two forms – Participant Medical Form and Informed Consent Form – attached to this cover letter to Outlook Pointe. If you have any questions concerning the research study, please contact me at (804) 317-4189 and leave a message and I will return your call as quickly as possible. Thank you for your cooperation and participation.

Sincerely,

Jim Hurtubise, M.S.
Department of Health, Safety, & Exercise Science
The University of Tennessee, Knoxville

Participant Medical Form

Name_____

Address_____ Telephone_____

_____

Age_____ Height_____ Weight_____ Blood Pressure_____

Heart Rate_____ Smoking Habits_____

Medication_____

_____

Other (Describe any special medical conditions):

_____

_____

_____

Functional Capacity: (circle appropriate restriction for current capacity)

- UNRESTRICTED — No restrictions need to be place on the individual with respect to vigorousness or type of activity.
- MODERATE — Ordinary physical activity needs to be moderately restricted and sustained strenuous effort needs to be avoided.
- MILD — Activity needs to be restricted to a major degree; all vigorous activity should be avoided.
- LIMITED — Ordinary physical activity needs to be markedly restricted.

Anatomical Analysis Form

Indicate body areas in which physical activity should be minimized or eliminated:

Body Area	Minimized	Eliminated	Both Sides	Right Side	Left Side
Neck					
Shoulder Girdle					
Hands, Wrists, Fingers					
Abdomen					
Legs					
Knees					
Hips					
Feet, Ankles, Toes					
Other (specify):					

Doctor's Signature:_____

Doctor's Name:_____
(please print)

Address (please print):_____

_____

Telephone:_____

Date:_____, 20____

November 3, 2004

Dear Prospective Participant,

This letter is written to invite you to participate in a research study designed to examine the benefits of balance training on fall-related self-efficacy in assisted-living populations. Balance and fall-related self-efficacy will be assessed through falls efficacy scales and measurements of static and dynamic balance.

If you decide to participate, the study will cover a 6-week period. The attached "informed consent" form explains the study in detail. This 6-week period includes: (1) a 1-week baseline assessment, (2) a 4-week normal aging period; and (3) a 1-week follow-up assessment.

Participation in the study will remain strictly confidential. All identifying information will be locked up in a file cabinet in my office at the University of Tennessee. Data used to report the research will include only statistical information and absolutely no identification information will be used. Identification information is needed only to maintain contact with you throughout the study period. A unique record number will be used to connect information between assessment periods. Results from this research study may be published, but your name will not be used.

If you would like to participate in this study, please complete and return the two forms – Participant Medical Form and Informed Consent Form – attached to this cover letter to Outlook Pointe. If you have any questions concerning the research study, please contact me at (865) 974-4215 and leave a message and I will return your call as quickly as possible. Thank you for your cooperation and participation.

Sincerely,

Jim Hurtubise, M.S.
Department of Health, Safety, & Exercise Science
The University of Tennessee, Knoxville

6632-B

Physician Cover Letter

Dear Health Care Provider,

_____ (Insert Patient Name), your patient, seeks to participate in a balance training program expected to increase balance. The training program is 6-weeks in length, with a 1-week baseline assessment, 4-week normal aging period, and a 1-week follow up assessment. Assessments will include Falls-Efficacy Scale (FES), single-leg stand, tandem leg stand, functional reach, and get up and go.

The exclusionary criteria are: (1) are less than 65 years of age; (2) are neurologically or cognitively impaired; (3) have a resting blood pressure in excess of 160/90 mmHg; (4) have limiting cardiorespiratory conditions or recent joint replacement surgery (within the past twelve months); (5) have a physician's judgment against participation; (6) no pre-existing inner ear/vestibular impairments; (7) no orthostatic hypotension; and (8) unable to rise out of a chair.

To minimize injury potential, you are requested to complete the attached "participant medical form" providing cautionary information as well as confirmation or denial of your patient's capability to participate fully in this study.

Thank you for your assistance in this matter.

Jim Hurtubise, M.S.
Department of Health, Safety, & Exercise Science
The University of Tennessee, Knoxville

jhurtubi@utk.edu, 02:25 PM 11/24/2004 -0500, Form D

To: jhurtubi@utk.edu
From: Brenda Lawson <blawson@utk.edu>
Subject: Form D
Cc: dklein1@utk.edu
Bcc:
Attached:

I have looked over you request to modify Form B #6632B titled "Effects of Balance Training on Fall-Related Self-Efficacy in Assisted-Living Older Adults", and I have a couple of questions.

It is my understanding from the Form D that you are just adding an additional site, however when reviewing the attached materials, I find the language in the letter to the prospective participant to be different from the one initially submitted. The current letter refers to "pre-normal aging, normal aging, post-normal aging. These references were not listed in the original letter.

The letter to the physician does not contain any of the exclusionary criteria that was included in the original.

First page of the Informed Consent under participant involvement does not include the last two items listed on the original consent form. The language in this consent form differs somewhat altogether from the original consent form.

Please provide further clarification of the above issues.

Thanks,
Brenda

11/29/04 Revisions received approved form D

APPENDIX D

FORMS

March 9, 2004

To Whom It May Concern,

NHC Place prides its self in providing a variety of interesting programs and activities for our residents. The age range for our resident is from a young sixty-three to a "young " one-hundred year old, the average age being eighty-four.

These residents are true volunteers. They are always open and willing to participate in any challenge or opportunity presented to them.

I have had several conservations with Jim Hurtubise Ph.D. Candidate at the The University of Tennessee. I feel that our residents would provide an excellent resource for Mr. Hurtubise' research study.

I am requesting that NHC Place be considered as a site for Mr. Hurtubise doctoral research project, and beginning a relationship with U.T. providing a clinical setting for future projects.

Sincerely,

Vivian Akins LPN
Admissions / Marketing Director

122 CAVETT HILL LANE
FARRAGUT, TENNESSEE 37922
PHONE: 865 • 777 • 9000

8501 South Northshore Drive
Knoxville, Tennessee 37922
(865) 670-0504
(865) 670-2745 Fax
www.manorhouseretirement.com

March 9 2004

TO WH OM IT MAY CONCERN:

As an a sisted living facility, it is vital to have community involvement and a volunteer spirit. W e have been involved with the University of Tennessee College of Educati n, Health a d Human Sciences to provide a clinical setting for students. This relations ip has bee a positive experienc e and we are continually seeking new ways to enhance quality f life for our residents here at Manorhouse. We discovered that we could beco ne a part f a research projec which would give our residents a structured balance assessm nt and plan for increasing strength, balance, and mobility.

I have s oken with Dr. Diane Klein and Jim Hurtubise to discuss the possibility of be ng involve in this work. Our facility is requesting to be a partner in the research project with Dr Klein and Jim Hurtubise.

Thank y u for the opportunity participate in this research project.

Best re ards,

Leann Drinnen

Leann D rinnen
Directo of Activities

Outlook Pointe
AT KNOXVILLE
A BALANCED CARE ASSISTED LIVING COMMUNITY

November 4, 2004

Dr. Diane A Klein, PHD, MS, MPH
Assistant Professor
UT Gerontology and Public Health
1914 Andy Holt Avenue
Knoxville, Tennessee 37996-2710

Dear Dr. Klein:

This letter is to serve as invitation for Doctoral Graduate Student, Jim Hurtubise, to perform performance tests for a balance study. It is understood there will be IRB permission forms completed for each participant (resident) at Outlook Pointe Assisted Living who will be involved in the study. There will also be an assistant with Jim Hurtubise to assure safety for the residents while performing the tests for balance.

As always, we look forward to participating and being involved with your research study program.

Sincerely,

Diane L. Williams

Diane L. Williams
Resident Relations Director

8024 Gleason Drive • Knoxville, TN 37919 • 423.690.3350 • FAX 423.690.7754
www.balancesclaire.com

THE UNIVERSITY OF TENNESSEE

Department of Health and Exercise Science
1914 Andy Holt Avenue
Knoxville, TN 37996-2710
(865) 974-5041
FAX (865) 974-6439

RESEARCH PERSONNEL CONFIDENTIALITY STATEMENT

By signing below, I acknowledge and understand that, as a member of the research team for "Effects of Balance Training On Fall-Related Self-Efficacy in Assisted-Living Older Adults" under the direction of James Hurtubise, M.S., in the Department of Health & Exercise Science, in the College of Education, Health, and Human Sciences, I am prohibited from releasing to any person (s) outside of the research team any medical and/or personal information which may come to attention during the course of my activities on this research project.

Moreover, I acknowledge and understand that any breach of confidentiality, participant or otherwise, resulting from my written or verbal release of information or records provides grounds for disciplinary action within the guidelines of the University of Tennessee IRB Review Committee and the policies of the University of Tennessee, Knoxville campus.

CONFLICT OF INTEREST POLICY ACKNOWLEDGEMENT

By signing below, I acknowledge that I have no "conflict of interest" with my activities for this research project.

_____ _____

Signature Principal Investigator's Signature

_____ _____

Date Date

_____

Print Name

THE UNIVERSITY OF TENNESSEE

Department of Health and Exercise Science
1914 Andy Holt Avenue
Knoxville, TN 37996-2710
(865) 974-5041
FAX (865) 974-6439

March 2, 2004

Dear Prospective Participant,

This letter is written to invite you to participate in a research study designed to examine the benefits of balance training on fall-related self-efficacy in assisted-living populations. Balance and fall-related self-efficacy will be assessed through falls efficacy scales and measurements of static and dynamic balance.

If you decide to participate, the study will cover a 6-week period. The attached "informed consent" form explains the study in detail. This 6-week period includes: (1) a 1-week pre-training period; (2) a 4-week balance training period; and (3) a 1-week post-training period.

Participation in the study will remain strictly confidential. All identifying information will be locked up in a file cabinet in my office at the University of Tennessee. Data used to report the research will include only statistical information and absolutely no identification information will be used. Identification information is needed only to maintain contact with you throughout the study period. A unique record number will be used to connect information between assessment periods. Results from this research study may be published, but your name will not be used.

If you would like to participate in this study, please complete and return the two forms – Participant Medical Form and Informed Consent Form – attached to this cover letter to either Vivian Akins or Jim Hurtubise . If you have any questions concerning the research study, please contact me at (865) 974-4215 and leave a message and I will return your call as quickly as possible. Thank you for your cooperation and participation.

Sincerely,

Jim Hurtubise, M.S.
Graduate Teaching Associate
Department of Health & Exercise Science
The University of Tennessee, Knoxville

THE UNIVERSITY OF TENNESSEE

Department of Health and Exercise Science
1914 Andy Holt Avenue
Knoxville, TN 37996-2710
(865) 974-5041
FAX (865) 974-6439

March 2, 2004

Dear Prospective Participant,

This letter is written to invite you to participate in a research study designed to examine the benefits of balance training on fall-related self-efficacy in assisted-living populations. Balance and fall-related self-efficacy will be assessed through falls efficacy scales and measurements of static and dynamic balance.

If you decide to participate, the study will cover a 6-week period. The attached "informed consent" form explains the study in detail. This 6-week period includes: (1) a 1-week baseline assessment and a 5-week normal aging period.

Participation in the study will remain strictly confidential. All identifying information will be locked up in a file cabinet in my office at the University of Tennessee. Data used to report the research will include only statistical information and absolutely no identification information will be used. Identification information is needed only to maintain contact with you throughout the study period. A unique record number will be used to connect information between assessment periods. Results from this research study may be published, but your name will not be used.

If you would like to participate in this study, please complete and return the two forms – Participant Medical Form and Informed Consent Form – attached to this cover letter to either Leann Drinnen or Jim Hurtubise . If you have any questions concerning the research study, please contact me at (865) 974-4215 and leave a message and I will return your call as quickly as possible. Thank you for your cooperation and participation.

Sincerely,

Jim Hurtubise, M.S.
Graduate Teaching Associate
Department of Health & Exercise Science
The University of Tennessee, Knoxville

EFFECTS OF BALANCE TRAINING ON FALL-RELATED SELF-EFFICACY IN ASSISTED-LIVING OLDER ADULTS

INFORMED CONSENT FORM

INTRODUCTION

I HAVE BEEN INFORMED THAT:

- James Hurtubise, who is a graduate teaching associate in the Department of Health and Exercise Science, in the College of Education, Health, and Human Sciences, at the University of Tennessee, Knoxville, Tennessee, has requested my participation in a research study for this institution, to be located at my home site.

- The purpose of the research is to examine the effectiveness of a balance training program to improve fall-related self-confidence in assisted-living older adults. To evaluate this, the study will assess changes in balance to: 1) improve balance for activities of daily living (ADLs) and instrumental activities of daily living (IADLs); and 2) improve self-confidence.

PARTICIPANT INVOLVEMENT IN THE STUDY

- My participation will involve securing my consent for participation and approval from my doctor.

- I will participate fully in all three stages of the study – pre-training, training, and post-training. The entire study will be six-weeks long.

- As a participant, I will participate in two separate one-hour assessments: 1) before the four-week training period and; 2) at the end of the four-week training period.

- At the end of the training period, my trainer, James Hurtubise, will teach me how to perform the set of exercises without a partner so that I can continue to do them safely on my own.

- Assessments will include one balance-confidence questionnaire and four balance activities.

- During the training stage (four weeks), I will work with my trainer two times per week for a period of up to 60 minutes per session, including blood pressure checks, warm-up, balance training, and cool-down.

Initials: _____

RISKS

- There may be some risk for injury for me if I agree to participate in this study, but no more than I would have doing my day-to-day routine. My trainer will take care not to let me push myself too far, and I must observe the same caution when working on my own.

BENEFITS

- The possible benefits of my participation in the research are improvements in: my balance, and mobility; my feelings of well-being; and my feelings of confidence. Plus, I will have contributed to improving health and well-being for other older adults in assisted-living populations when the results of this study are shared in seminars, conferences, classes, and publications.

CONFIDENTIALITY

- The results of the research study may be published but my name and identity will not be revealed. In order to maintain confidentiality of my records, James Hurtubise will assign a unique identification number to track my records so that all identifying information can be separated from the data scores and statistics. The identifying information will be locked in a file cabinet in James Hurtubise's office (Room 378, HPER Building), accessible only to James Hurtubise. Data used to report the research will include only the scores and statistical information and absolutely no identification information will be used. All field notes taken during the visitation and/or training will also be locked in the same file cabinet.

COMPENSATION

- I will not be paid for my participation in the study.

EMERGENCY MEDICAL TREATMENT

- The University of Tennessee does not "automatically" reimburse participants for medical claims or other compensation. If physical injury is suffered in the course of research, or for more information, I will notify the investigator in charge, James Hurtubise at (865) 974-4215.

- In case of injury, I can seek the appropriate treatment or care for injuries incurred at my residence facility's health center, which will be provided at my expense.

Initials: _____

CONTACT INFORMATION

- If I have any questions at any time about the study or the procedures, or if I experience adverse effects as a result of participating in this study, I may contact the researcher, James Hurtubise at the University of Tennessee, Department of Health and Exercise Science, 1914 Andy Holt Avenue, Knoxville, TN 37996-2710, and phone number (865) 974-4215.

- If I have questions about my rights as a participant in this research, or if I feel I have been placed at risk, I can contact the Research Compliance Services of the Office of Research at the University of Tennessee at (865) 974-3466

PARTICIPATION

- My participation in this study is strictly voluntary and I may choose not to participate or if I participate, I may choose to withdraw from the study at any time without affecting my treatment or care.

CONSENT

- The nature, demands, benefits, and any risk of the project have been explained to me. I knowingly assume any risks involved. I understand that I may withdraw my consent and discontinue participation at any time without penalty or loss of benefit to myself.

- I have read the above information. In signing this consent form, I am not waiving any legal claims, rights, or remedies. A copy of this consent form will be given to me. I agree to participate in this study.

Participant's Name _____ Date:_____
(Please Print Full Name)

Participant's Signature _____ Date:_____
(Full Legal Signature)

Other Signature _____ Date:_____
(Power of Attorney Signature, if appropriate)

Initials: _____

1. "I certify that I have explained to the above individual the nature and purpose, the potential benefits and possible risks associated with participation in this research study, have answered any questions that have been raised, and have witnessed the above signature."

2. "These elements of Informed Consent conform to the Assurance given by the University of Tennessee to the Department of Health & Human Services to protect the rights of human subjects."

3. "I have provided the subject/participant a copy of this signed consent document."

Signature of Investigator_____ Date:_____

Initials: _____

EFFECTS OF BALANCE ASSESSMENTS ON FALL-RELATED SELF-EFFICACY IN ASSISTED-LIVING OLDER ADULTS

INFORMED CONSENT FORM

INTRODUCTION

I HAVE BEEN INFORMED THAT:

- James Hurtubise, who is a graduate teaching associate in the Department of Health and Exercise Science, in the College of Education, Health, and Human Sciences, at the University of Tennessee, Knoxville, Tennessee, has requested my participation in a research study for this institution, to be located at my home site.
- The purpose of the research is to examine normal aging effect on balance by reviewing activities of daily living (ADLs) and instrumental activities of daily living (IADLs) and self-confidence.

PARTICIPANT INVOLVEMENT IN THE STUDY

- My participation will involve securing my consent for participation and approval from my doctor
- I am expected to participate fully in both assessments of the study – baseline and normal aging. The entire study will cover a six-week period.
- Assessments will include one balance-confidence questionnaire and four balance activities.

RISKS

- There may be some risk for injury for me if I agree to participate in this study, but no more than I would have doing my day-to-day routine. My trainer will take care not to let me push myself too far, and I must observe the same caution when working on my own.

BENEFITS

- The possible benefits of my participation in the research are: (1) contributing to improving health and well-being for other older adults in assisted-living populations when the results of this study are shared in seminars, conferences, classes, and publications and (2) an opportunity to participate in future balance training courses at my residence.

Initials:_____

CONFIDENTIALITY

- The results of the research study may be published but my name and identity will not be revealed. In order to maintain confidentiality of my records, James Hurtubise will assign a unique identification number to track my records so that all identifying information can be separated from the data scores and statistics. The identifying information will be locked in a file cabinet in James Hurtubise's office (Room 378, HPER Building), accessible only to James Hurtubise. Data used to report the research will include only the scores and statistical information and absolutely no identification information will be used. All field notes taken during the assessments will also be locked in the same file cabinet.

COMPENSATION

- I will not be paid for my participation in the study.

EMERGENCY MEDICAL TREATMENT

- The University of Tennessee does not "automatically" reimburse participants for medical claims or other compensation. If physical injury is suffered in the course of research, or for more information, I will notify the investigator in charge, James Hurtubise at (865) 974-4215.

- In case of injury, I can seek the appropriate treatment or care for injuries incurred at my residence facility's health center, which will be provided at my expense.

CONTACT INFORMATION

- If I have any questions at any time about the study or the procedures, or if I experience adverse effects as a result of participating in this study, I may contact the researcher, James Hurtubise at the University of Tennessee, Department of Health and Exercise Science, 1914 Andy Holt Avenue, Knoxville, TN 37996-2710, and phone number (865) 974-4215.

- If I have questions about my rights as a participant in this research, or if I feel I have been placed at risk, I can contact the Research Compliance Services of the Office of Research at the University of Tennessee at (865) 974-3466

PARTICIPATION

- My participation in this study is strictly voluntary and I may choose not to participate or if I participate, I may choose to withdraw from the study at any time without affecting my treatment or care.

Initials:_____

CONSENT

- The nature, demands, benefits, and any risk of the project have been explained to me. I knowingly assume any risks involved. I understand that I may withdraw my consent and discontinue participation at any time without penalty or loss of benefit to myself.

- I have read the above information. In signing this consent form, I am not waiving any legal claims, rights, or remedies. A copy of this consent form will be given to me. I agree to participate in this study.

Participant's Name _____ Date:_____
(Please Print Full Name)

Participant's Signature _____ Date:_____
(Full Legal Signature)

Other Signature _____ Date:_____
(Power of Attorney Signature, if appropriate)

1. "I certify that I have explained to the above individual the nature and purpose, the potential benefits and possible risks associated with participation in this research study, have answered any questions that have been raised, and have witnessed the above signature."

2. "These elements of Informed Consent conform to the Assurance given by the University of Tennessee to the Department of Health & Human Services to protect the rights of human subjects."

3. "I have provided the subject/participant a copy of this signed consent document."

Signature of Investigator_____ Date:_____

Initials:_____

THE UNIVERSITY OF TENNESSEE

Department of Health and Exercise Science
1914 Andy Holt Avenue
Knoxville, TN 37996-2710
(865) 974-5041
FAX (865) 974-6439

Physician Cover Letter

April 8, 2004

Dear Health Care Provider,

_____ (Insert Patient Name), your patient, seeks to participate in a balance training program expected to increase balance. The training program is 6-weeks in length, with a 1-week pre-training period, 4-week training period, and a 1-week post-training period. Assessments will include Falls-Efficacy Scale (FES), single-leg stand, tandem leg stand, functional reach, and get-up-and-go.

Balance training will include 6-8 exercises, for 1-2 sets, with 30 seconds to 1 minute rest between sets. Static body positions and gentle dynamic movements will be used to engage proprioceptors. To minimize injury potential, you are requested to complete the attached "participant medical form" providing cautionary information as well as confirmation or denial of your patient's capability to participate fully in this study.

Thank you for your assistance in this matter.

Jim Hurtubise, M.S.
Graduate Teaching Associate
Department of Health and Exercise Science
The University of Tennessee, Knoxville

THE UNIVERSITY OF TENNESSEE

Department of Health and Exercise Science
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Knoxville, TN 37996-2710
(865) 974-5041
FAX (865) 974-6439

Physician Cover Letter

April 8, 2004

Dear Health Care Provider,

_____ (Insert Patient Name), your patient, seeks to participate in a balance assessment program expected to increase balance. The study is 6-weeks in length, with a baseline period and a 5-week normal aging period. Assessments will include Falls-Efficacy Scale (FES), single-leg stand, tandem leg stand, functional reach, and get-up-and-go.

To minimize injury potential, you are requested to complete the attached "participant medical form" providing cautionary information as well as confirmation or denial of your patient's capability to participate fully in this study.

Thank you for your assistance in this matter.

Jim Hurtubise, M.S.
Graduate Teaching Associate
Department of Health & Exercise Science
The University of Tennessee, Knoxville

Participant Medical Form

Name_____

Address_____ Telephone_____

_____

Age_____ Height_____ Weight_____ Blood Pressure_____

Heart Rate_____ Smoking Habits_____

Medication_____

_____

Other (Describe any special medical conditions):

_____

_____

_____

Functional Capacity: (circle appropriate restriction for current capacity)

- UNRESTRICTED — No restrictions need to be place on the individual with respect to vigorousness or type of activity.
- MODERATE — Ordinary physical activity needs to be moderately restricted and sustained strenuous effort needs to be avoided.
- MILD — Activity needs to be restricted to a major degree; all vigorous activity should be avoided.
- LIMITED — Ordinary physical activity needs to be markedly restricted.

Anatomical Analysis Form

Indicate body areas in which physical activity should be minimized or eliminated:

Body Area	Minimized	Eliminated	Both Sides	Right Side	Left Side
Neck					
Shoulder Girdle					
Hands, Wrists, Fingers					
Abdomen					
Legs					
Knees					
Hips					
Feet, Ankles, Toes					
Other (specify):					

Doctor's Signature:_____

Doctor's Name:_____
(please print)

Address (please print):_____

_____

Telephone:_____

Date:_____, 20____

APPENDIX E

FALLS-EFFICACY SCALE

WebMail - RE: Falls-Efficacy Scale - May I use it?

Date Sent: Wednesday, March 03, 2004 08:25 AM

From: met5@email.med.yale.edu Add to Address Book

To: jhurtubi

Subject: RE: Falls-Efficacy Scale - May I use it?

Status: Urgent New

Please feel fre to use the Falls Efficacy Scale.

Best wishes,

Mary Tinetti

jhurtubi wrote:

>Good Afternoon!
>
>My name is Jim Hurtubise. I am a doctoral student in Community Health at the
>University of Tennessee, Knoxville and am hoping to begin my research this
>May. My topic is "Effects of Balance Training on Fall-Related Self-Efficacy in
>Assisted-Living Older Adults".
>
>I have been very impressed by your work and would like to receive your
>permission to use the FES scale for my study.
>
>Sincerely,
>
>Jim Hurtubise
>
>
>

Falls Efficacy Scale (FES)

Now I have some questions about common daily activities. For each of the following activities, please tell me how concerned you are about the possibility of falling: not at all concerned, somewhat concerned, fairly concerned, or very concerned. Ask the following question for each of the ten daily activities and circle the corresponding number/letter associated with most appropriate response:

"How concerned are you that you might fall while (ask activity below):"

	Not At All Concerned	Somewhat Concerned	Fairly Concerned	Very Concern
FES 1. Cleaning the house	1	2	3	4
FES 2. Getting dressed or undressed	1	2	3	4
FES 3. Preparing simple meals	1	2	3	4
FES 4. Taking a bath or shower	1	2	3	4
FES 5. Simple shopping	1	2	3	4
FES 6. Getting in and out of a chair	1	2	3	4
FES 7. Going up and down stairs	1	2	3	4
FES 8. Walking around the neighborhood	1	2	3	4
FES 9. Reaching into cabinets or closets	1	2	3	4
FES 10. Going to answer the telephone before it stops ringing	1	2	3	4

Total FES Score: _____

APPENDIX F

BALANCE TRAINING EXERCISE DESCRIPTIONS

BALANCE TRAINING EXERCISE DESCRIPTIONS

All Balance Exercises Are Performed While Both Feet Are Standing On A 2 ½ Inch Thick Foam Pad.

STATIC BALANCE EXERCISES

1. Plantar Flexion

1. Stand straight, holding onto a table or chair for balance.*
2. Slowly stand on tip toe of preferred leg, as high as possible.
3. Hold position for thirty seconds.
4. Slowly lower heels all the way back down.
5. Repeat with other leg.

2. Knee Flexion

1. Stand straight, hold onto table or chair for balance.*
2. Slowly lift foot, of preferred leg, as close to buttock as possible, so foot lifts up behind you.
3. Hold position for thirty seconds.
4. Slowly lower foot all the way back down.
5. Repeat with other leg.

3. Hip Flexion

1. Stand straight, holding onto a table or chair for balance.*
2. Slowly bend one knee, of preferred leg, toward chest, without bending waist or hips.
3. Hold position for thirty seconds.
4. Slowly lower leg all the way down.
5. Repeat with other leg.

4. Hip Extension

1. Stand 12 to 18 inches from table.
2. Bend forward at hips; hold onto table.
3. Slowly lift one leg, of preferred side, straight backwards.
4. Hold position for thirty seconds.
5. Slowly lower leg.
6. Repeat with other leg.

5. Side Leg Raise

1. Stand straight, directly behind table or chair, feet slightly apart.
2. Hold table for balance.*
3. Slowly lift one leg, of preferred side, to side, 6-12 inches.
4. Hold position for thirty seconds.
5. Slowly lower leg.
6. Repeat with other leg.
7. Your back and knees are straight throughout exercise.

* To increase the difficulty of each exercise, participants progressed from a two hand touch on the back of the chair to a one hand touch, one fingertip touch, no hands eyes open position, and no hands eyes closed position.*

DYNAMIC BALANCE EXERCISES

1. Walking Forward

    1. Face the mat lengthwise.
    2. Move one foot in front of the other.
    3. Keep eyes open.
    4. Keep head and back straight.
    5. Tighten abdominal muscles.
    6. Continue until reach end of mat then repeat.

2. Walking Backward (opposite Walking Forward)

    1. Face the mat lengthwise.
    2. Move one foot in front of the other.
    3. Keep eyes open.
    4. Keep head and back straight.
    5. Tighten abdominal muscles.
    6. Continue until reach end of mat then repeat.

3. Shuffle

    1. Face the mat widthwise.
    2. Keep eyes open.
    3. Keep head and back straight.
    4. Tighten abdominal muscles.
    5. Stand with feet twelve inches apart.
    6. Pick up left foot and step lengthwise.
    7. Pick up right foot and step in same direction.
    8. Continue until reach end of mat then go back facing same direction.

4. Braid Walking
   (Maintain same body position as Shuffle.)
   1. Face the mat widthwise.
   2. Keep eyes open.
   3. Keep head and back straight.
   4. Tighten abdominal muscles.
   5. Stand with feet twelve inches apart.
   6. Pick up right foot and crossover left foot.
   7. Pick up left foot and crossover right foot.
   8. Continue until reach end of mat then go back facing same direction.

5. Circle Walking
   (Maintain same body position as Shuffle.)
   1. Face the mat widthwise.
   2. Keep eyes open.
   3. Keep head and back straight.
   4. Tighten abdominal muscles.
   5. Stand with feet twelve inches apart.
   6. Start with right foot at corner of mat.
   7. Pick up left foot and step lengthwise.
   8. Pick up right foot and step in same direction.
   9. When reach end of mat, turn body around and Continue moving in an arc pattern until reach other end of mat.
   10. Then repeat.

To increase the difficulty of each exercise, participants were encouraged to perform each maneuver with their eyes closed.

APPENDIX G

BALANCE TRAINING INTERVENTION

Balance Exercise Sheet

General Dynamic Warm Up (Seated in Chair)

- ✓ 3 Slow & Deep Breaths (In Nose & Out Mouth; 3 second hold)

- ✓ Perform each activity for 10 reps.
  1. Ankle Circles
  2. Ankle Flexion & Extension
  3. March in Place
  4. Alt. Leg Extension
  5. Lower Back & Chest Stretch
  6. Arm Circles
  7. Shoulder Rolls
  8. 3 Position Neck Rotations

- ✓ 3 Slow & Deep Breaths (In Nose & Out Mouth; 3 second hold)

Training Intervention – See Next Page

General Dynamic Cool Down (Seated in Chair)

- ✓ 3 Slow & Deep Breaths (In Nose & Out Mouth; 3 second hold)

- ✓ Perform each activity for 5 reps.
  1. Ankle Circles
  2. Ankle Flexion & Extension
  3. March in Place
  4. Alt. Leg Extension
  5. Lower Back & Chest Stretch
  6. Arm Circles
  7. Shoulder Rolls
  8. 3 Position Neck Rotations

- ✓ 3 Slow & Deep Breaths (In Nose & Out Mouth; 3 second hold)

Training Phase

Training Week	Exercise	Variation	Sets	Repetitions	Rest/Set
1	Plantar Flexion	Two Hands	1	10	30 sec.
	Single-Leg Stand	Two Hands	1	30 seconds	30 sec.
	Hip Flexion	Two Hands	1	30 seconds	30 sec.
	Hip Extension	Two Hands	1	30 seconds	30 sec.
	Side Leg Raise	Two Hands	1	30 seconds	30 sec.
	Walking (F)	Two Hands	1	10	30 sec.
	Walking (B)	Two Hands	1	10	30 sec.
	Braid Walking	Two Hands	1	10	30 sec.
	Shuffle	Two Hands	1	10	30 sec.
	Circle Walk	Two Hands	1	10 (5 Each Way)	30 sec.
2	Plantar Flexion	One Hand	1	10	30 sec.
	Single-Leg Stand	One Hand	1	30 seconds	30 sec.
	Hip Flexion	One Hand	1	30 seconds	30 sec.
	Hip Extension	One Hand	1	30 seconds	30 sec.
	Side Leg Raise	One Hand	1	30 seconds	30 sec.
	Walking (F)	One Hand	1	10	30 sec.
	Walking (B)	One Hand	1	10	30 sec.
	Braid Walking	Two Hands	1	10	30 sec.
	Shuffle	One Hand	1	10	30 sec.
	Circle Walk	One Hand	1	10 (5 Each Way)	30 sec.
3	Plantar Flexion	One Finger	2	10	1 minute
	Single-Leg Stand	One Finger	2	30 seconds	1 minute
	Hip Flexion	One Finger	2	30 seconds	1 minute
	Hip Extension	One Finger	2	30 seconds	1 minute
	Side Leg Raise	One Finger	2	30 seconds	1 minute
	Walking (F)	One Finger	2	10	1 minute
	Walking (B)	One Finger	2	10	1 minute
	Braid Walking	Two Hands	2	10	1 minute
	Shuffle	One Finger	2	10	1 minute
	Circle Walk	One Finger	2	10 (5 Each Way)	1 minute
4	Plantar Flexion	No Hands	2	10	1 minute
	Single-Leg Stand	No Hands	2	30 seconds	1 minute
	Hip Flexion	No Hands	2	30 seconds	1 minute
	Hip Extension	No Hands	2	30 seconds	1 minute
	Side Leg Raise	No Hands	2	30 seconds	1 minute
	Walking (F)	No Hands	2	10	1 minute
	Walking (B)	No Hands	2	10	1 minute
	Braid Walking	Two Hands	2	10	1 minute
	Shuffle	No Hands	2	10	1 minute
	Circle Walk	No Hands	2	10 (5 Each Way)	1 minute

APPENDIX H

ANECDOTAL COMMENTS

ANECDOTAL COMMENTS

(These anecdotal comments were recorded as part of the researcher's field notes but were not part of the formal research process.)

1) After completing the intervention, two participants verbally expressed how much more control they felt when walking the hall ways of the facility and getting in and out of a chair.

2) During the third week of the intervention, one participant revealed how they never thought that they would be able to stand on one leg or feel safe when getting up at night to use the rest room.

3) Another participant indicated that they had limited the use of their walker and began to use their cane more often, since the second week of the intervention.

4) After the intervention completed, two older adults expressed how much they enjoyed doing balance exercises and they will now begin to regularly participate in the assisted-living's exercise program.

VITA

Born to Roger and Patricia Hurtubise in Portland, Maine on May 19, 1977, James Norman Hurtubise graduated from Biddeford High School in 1995. A Frisbie Award of Health & Fitness Excellence recipient, James graduated Magna Cum Laude with a Bachelor's of Science in Health & Fitness from Springfield College in 1999. During the fall of 1999 through Spring of 2001, he served as an accomplished Graduate Assistant Strength & Conditioning Coach with the University of Tennessee (UT) Lady Vols, while completing his Masters of Science Degree in Sport Management. Not ready to leave UT academia just yet, in the fall of 2001, James began his quest to earn a Doctoral degree in Human Ecology, specializing in Community Health Education and Gerontology. After working as Graduate Teaching Associate, finishing his required coursework, written and oral exams, and beginning his dissertation, James left UT for a year and a half to open a new chapter of marriage, career change, and fatherhood. While serving as Director of Operations for the Richmond market of N & R Dining, a Burger King franchisee, he decided to go back to school and finish what he had started. On May 12, 2006, James Hurtubise's hard work had finally paid off being the first person in his family to earn a Ph.D.